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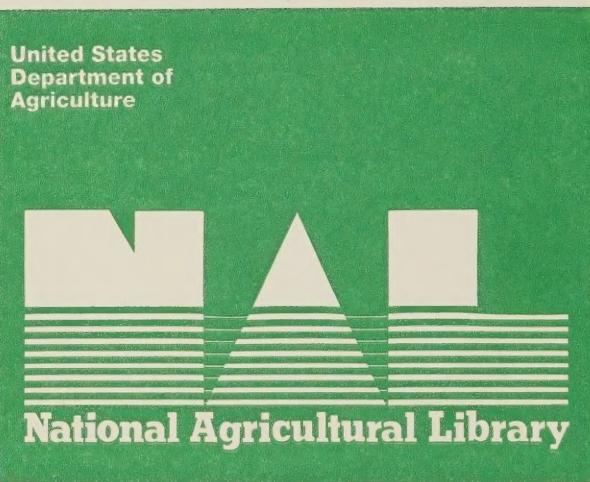
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The American Farmer



United States Department of Agriculture • Economic Research Service



A Collection of Articles From The Farm Index Magazine, January 1975-January 1976
Economic Research Service, U.S. Department of Agriculture

Foreword

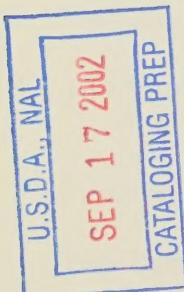
You are about to retrace with the American farmer one of the greatest success stories of all time. Starting from a precarious foothold on the eastern edge of a vast and unknown continent not so very long ago, he pushed relentlessly westward. By the beginning of this century, he and his fellow patriots had brought more than a billion acres of wilderness into production and had laid the foundations for the world's most productive agricultural plant. We are not only the best fed nation, but we are also able to provide the food and fiber needs of millions around the globe.

It is a story that bears repeated telling, for most Americans have long been separated from their agricultural origins. A nation that was mainly agricultural when the Declaration of Independence was signed has become overwhelmingly urban. Fewer than 5 out of 100 of us now live on a farm. Paradoxically, though, the relative decline in the farm population has not diminished agriculture's importance in the economy. Two centuries ago, Americans generally produced part of their own food. Most families had a garden, a flock of chickens, a cow or a pig or two—even those in the larger towns. Today, most of us are totally dependent on distant farms for the food we eat.

The farms of today are a lot different, too. Most of them, the ones that are primarily responsible for putting the food on your table, are commercial businesses. They rely mainly on costly machinery instead of labor to get the job done. Today's farmer has a huge investment in this land. Also, to raise the crops and animals, he must put up much risk money each year and hope it pays off. We still are paying for the labor involved in agricultural production. But often as not, the laborer is the steelworker producing the parts of a tractor.

We hope the following pages will convey something of the drama of the American agricultural story, and something of the complexity of the forces that have shaped it. We hope further that as we examine our past in this Bicentennial year, this booklet will help put in perspective the farmer's contribution to our national heritage, and the role he plays in the economy of today.

Quentin M. West
Administrator of the Economic Research Service



The articles for this publication were planned and edited by Wayne V. Dexter, Editorial Consultant and formerly Director of Information of the Economic Research Service.

Art Director: James Schleyer, Office of Communication.

Production Coordinators: The staff of The Farm Index—Martin Schubkegel, Editor; Daniel R. Williamson, Associate Editor; Virginia Broadbeck, Dorothy Mayes, Martha Newton, Staff Editors; Marlene Proctor, Clerk-Typist.

Director of Information: Benjamin R. Blankenship, Jr.

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The First 200 Years

by Wayne D. Rasmussen

Today's American farmer little resembles his colonial ancestor of 2 centuries ago. He heads a commercial enterprise his forefathers couldn't have imagined. Yet the resources, institutions, and technology that make American agriculture the world's most productive trace directly back to our early beginnings.

Nature richly endowed American agriculture. A wide range of productive land and climate allows production of virtually every agricultural commodity except some tropical fruit and vegetables, fibers, and spices.

Equally important, Americans have always been receptive to technological innovations that increase produc-

tion and reduce physical labor. The farmer is no exception.

The rate at which innovations have been introduced has vastly increased in the last 3 decades. In contrast to earlier times when inventions or improved practices tended to be adopted one-at-a-time, today's farmer is using a "systems" approach to increase agricultural productivity.

Potpourri of progress. The package of improved practices on typical modern farms includes tractors and other machines; improved and hybrid seeds and livestock; fertilizer; productive use of water through irrigation and drainage; the application of chemicals to control weeds, fungi, and insects; the widespread use of conservation practices; and the balanced feeding of livestock.

Agriculture sometimes reaches into other fields for advanced technology to solve a problem. A recent example is the conquest of the screwworm, a cattle pest, by using irradiation to sterilize the male insects.

One result of the technological changes in agriculture was a dramatic drop in the proportion of the Nation's work force needed to produce food and fiber. In 1974, only 4 percent of the Nation's labor worked in farming compared with 20 percent in 1935. In 1776, it was 90 percent.

Another indication is that since 1935, the number of people living on farms has dropped from 32 million to a little over 9 million. Meanwhile, the number of farms has fallen from almost 7 million to less than 3 million.

Going commercial. Increased reliance on technology has meant that today's farmer must buy more of the things needed for production from industry or other farmers than his dad did. He also sells a much larger share of the output of his farm. Except for the subsistence farmer on one hand and the gentleman farmer on the other, he's a commercial operator, producing for the market.

Furthermore, his market is no longer just down the road to the closest town. It's also national and



Metal milk cans, time-honored symbol of the American dairy, are lifted onto a local delivery truck to be hauled away for processing.

international. Demands vary from year to year, and largely because of changes in foreign requirements. This broadening of the market has opened up opportunities for the farmer, but also exposed him to some problems.

Bulk trucks, which pump milk directly from a dairy's refrigerated storage tank, form the modern link between producer and processor.

Ideally, farmers together should produce the exact amount each year that would meet the market demands and, at the same time, yield fair returns for labor and investment. But variations in weather, combined with an unpredictable foreign demand and



the fact that each farmer makes up his own mind about what he will plant, have brought problems of alternating surpluses and shortages.

Help from the Government. Thus, the Federal Government has helped the farmer adjust to these problems, beginning in 1929 with the Agricultural Marketing Act and continuing with the Agricultural Adjustment Acts of 1933 and 1938.

The shortages of World War I were not severe and were handled by voluntary programs. Those of World War II were handled by allocation and rationing. In both instances, farmers responded with increased production, but then suffered for it when foreign demand slackened and prices dropped sharply.

Then during the 1950's and 1960's, programs were developed to aid foreign nations and our own disadvantaged people by sending them our food surpluses.

In 1972-73, however, the surpluses disappeared on the heels of worldwide weather disasters and increased foreign commercial demand for American products. By 1974, when famine again hit several nations in Asia and Africa, the U.S. faced demands it could not meet, driving food prices higher and higher in the grocery stores. Government controls on production were removed in 1973 and 1974 but bad weather in 1974 drove crop production down. Given halfway decent growing weather, however, there is every reason to believe that the shortages will be only temporary.

Sustained growth. Such belief, and optimism over agriculture's ability to produce, is grounded in historical fact. U.S. farm output has increased by a fourth since 1960, by a half since 1950. And it's doubled since the 1930's, and nearly tripled since the start of the 20th century.

The roots of this almost constantly increasing production go back to the American Revolution. Among the causes of the Revolution were British controls over trade in colonial farm products and restrictions on expansion to new farmlands in the West.

The land question was tackled by the new Nation soon after it won its independence and before it adopted the Constitution. The Ordinance of 1785 provided for surveying the West into townships, each containing 36 sections of 1 square mile, and then offering them at auction. One section in each township was reserved for public schools.

The Ordinance of 1787, one of the most important laws ever passed in the U.S., provided for dividing the old Northwest into territories that would become States on equal terms with the original States when population reached a certain level. Settlers were protected by a bill of rights and slavery was prohibited. The genius of the ordinance lay in

A Bountiful Land

The land area of the United States—Alaska to Hawaii, Minnesota to Florida, Maine to California—totals over 2 billion acres. About one-half is in farms, of which two-fifths is cropland. About 40 million acres are irrigated. The other half is in pasture and range, woodland, and wasteland.

Our climate ranges from the subtropical in the extreme South to the long, cold winters of the North. Rainfall varies from almost nothing in the southwestern deserts to near 60 inches in the southern coastal areas. The midwestern agricultural area receives from 30 to 45 inches a year.

Along the eastern coastal plain, the land flattens out. The sandy soil is suitable for crop and forest production. Toward the Appalachian Mountains to the west, the land is mostly in grain, open fields, pastures and forests. West of the Appalachians, the land slopes to the Ohio, Mississippi and Missouri Rivers, and the highly productive Central Plains.

Further west, in the Great Plains, the rainfall is low and the treeless land is used for grazing livestock and growing wheat and other grain. The land between the Rocky Mountains and the Pacific Coast is arid, although a number of irrigated valleys are very productive. The West Coast, with irrigation in the south and heavy rainfall in the north, produces fruits and vegetables, including citrus fruit in California, as well as specialty crops.

The center of corn and hog production lies in the upper Mississippi Valley, while soybeans are grown throughout the Valley. Wheat farming is concentrated in the Great Plains and Pacific Northwest. Cotton is grown in the South and Southwest, and tobacco and peanuts in the Southeast. Broilers and timber for pulpwood are also produced in the South. Vegetables are grown almost everywhere, with concentrations on the Atlantic and Pacific coasts and in irrigated southwestern valleys. Sugarcane is centered in Hawaii, Louisiana, and Florida, while sugarbeets are grown mainly in the West.

Fruits and nuts grow in a number of areas, though commercial citrus production is limited to Florida, California, Texas, and Arizona. Dairying is important in the North Central and Northeastern States, partly because of the large population there and partly because dairying is one of the most efficient uses of the land. Most beef cattle are raised in the High Plains and then fattened either there or in the North Central States.

Sheep production also is centered in the Plains. There is poultry production throughout the country, with many egg producing centers around urban areas. Broiler production is more concentrated in the South, from Delaware to Arkansas. Turkeys are produced in many States, with California, Minnesota, Missouri, Texas, and North Carolina the leaders.

preventing what could have become a "colonial" problem by providing for the equality of new States.

Developments in Dixie. In the South, the settlers were, at first, frontiersmen, whose farms were patches of corn and beans and homes for a few hogs. In those early times, there seemed little likelihood that slavery would prove profitable in the South. In fact, it appeared that slavery might be coming to an end because of a decline in the demand for American tobacco.

However, in 1793, Eli Whitney, a young graduate of Yale University, invented a practical cotton gin, which separated the seeds from the lint of short-staple cotton quickly and at a low cost. His invention made slavery profitable, encouraged planters to move west, and made cotton the preeminent agricultural export of the new Nation.

The northern frontier was characterized by small farmers who practiced a self-sufficient agriculture, though cattle raised in the Ohio River Valley were driven to eastern markets. Later, wheat became the main cash crop, encouraged by the opening of the Erie Canal in 1825.

A time for invention. The particular cultivation needs in the prairies led farmers and blacksmiths to invent new tools and machines. Two Illinois blacksmiths, John Lane and John Deere, separately used steel for the shares and moldboards of plows. These plows efficiently turned the sticky prairie soil, which had tended to cling to the conventional wooden or iron plows.

The critical point in raising wheat was the harvesting of the ripe grain before it was lost through rain, hail, or wind. For centuries, men and women had worked in the harvest with scythes and sickles, just as many farmers of the world still do. In 1831, Cyrus H. McCormick of Virginia built a workable, horse-drawn grain harvester. At about the same time, Obed Hussey of Cincinnati built a similar machine. Over the years, McCormick came to dominate the market, partly because he moved



With only horse-drawn implements to aid, potato harvesting was back-breaking work at the turn of the century.

his factory to Chicago, the future grain marketing center, while Hussey began production in Baltimore.

Other important machines powered by horses were invented, including the grain drill, cultivator, mower, and threshing machine. These inventions marked the beginning of the first great "agricultural revolution" in the U.S.—the

change from hand to horse-powered equipment accompanied by a transition from self-sufficient to commercial agriculture in the North.

The changes got under way slowly, though. Many farmers either lacked the capital or were unwilling to risk the little money they had to buy the new machines. Then the Civil War brought labor shortages, strong de-

Now fully mechanized, potato harvesting requires hand labor only to sort out rocks and other debris.





An early-day midwestern farmer resorts to hand combat to save his field from grasshoppers.

mand, and high prices for farm products. Adoption of the new technology caught on fast in the late 1860's and the early 1870's.

Key legislation. The transition was encouraged by four major laws signed by President Abraham Lincoln. They were: the Homestead Act, granting 160 acres of land to western settlers; the Morrill Land Grant College Act,

granting public land to each State for a college to teach agriculture and mechanical engineering; the act establishing USDA; and an act granting land to build a transcontinental railroad. The land grant colleges were later strengthened by the Hatch Experiment Station Act of 1887, providing for an agricultural experiment station in each State.

Aerial spraying, dusting, and fogging help today's farmer in the never-ending struggle against pests and disease.



The first American agricultural revolution and the continued settlement of new land led to a marked increase in total production—doubling between 1870 and 1900.

Farm prices declined between 1870 and 1900 as surpluses developed, picked up between 1900 and World War I, increased sharply during the war, and then declined as sharply during the 1920's. The Nation continued to be a major exporter of agricultural products until after World War I. These sales provided a substantial part of the foreign exchange needed by our developing industry. Exports were low during the 1920's and 1930's but picked up during World War II and have been substantial ever since.

USDA responds. The agricultural depression of the 1920's led to many proposals to help the farmer. Within USDA, the Bureau of Agricultural Economics was established in 1922 to bring economic knowledge to bear on farm problems. The Extension Service had been established earlier, in 1914, to carry scientific knowledge directly to the farmers.

Much of the early work of the agricultural economists and of the extension agents was devoted to the individual farmer. The farmer could be helped to manage his farm carefully, cutting unnecessary expenses but growing as much as possible of needed crops, so that he might prosper in spite of low prices. Farm management studies were made and situation and outlook conferences were held to help the farmer make profitable decisions.

In many parts of the Nation, nature seemed to join forces with the economic depression against the farmers. In the early 1930's a series of droughts turned part of mid-America into a dust bowl. Thousands of farmers and their families left Oklahoma, Texas, and other States in the hope of finding jobs in California.

Cooperative approach. Farm organizations urged farmers to join both purchasing and marketing cooperatives. If farmers bought through co-
(Continued on page 10)





Milestones in American Agriculture

- 1793 • Eli Whitney invented cotton gin.
- 1825 • Erie Canal completed, opening western farmlands to European markets.
- 1833 • McCormick reaper patented.
- 1837 • Steel plows used in the prairies.
- 1849 • Mixed fertilizers first manufactured commercially.
- 1862 • Morrill Land Grant College Act gave land to each State for colleges to teach agriculture and mechanical arts; Homestead Act gave 160 acres of Federal land to each settler; Transcontinental Railroad Act granted land and cash for building Union Pacific Railroad.
- 1867 • Founding of National Grange, first nationwide farm organization.
- 1875 • First State-supported agricultural experiment station established.
- 1892 • Successful gasoline tractor built.
- 1914 • Smith-Lever Act formalized cooperative extension work on a national basis.
- 1916 • Federal Farm Loan Act guaranteed payments of certain loans made to farmers.
- 1926 • Hybrid corn seed became commercially available.
- 1927 • Mechanical cotton picker invented.
- 1933 • First Agricultural Adjustment Act authorized voluntary production adjustments, marketing agreements, and price supports for farm products.
- 1935 • Rural Electrification Administration established to make loans to rural cooperatives for farm electrification.
- 1937 • Farm Security Administration, later succeeded by the Farmers Home Administration, established to help farm workers acquire their own land and to encourage the development of efficient farms.
- 1949 • "Package of agricultural practices" concept showed greater gains in production when a number of improved inputs, such as better seeds, fertilizers, machinery, and irrigation, were used together.
- 1954 • Public Law 480 authorized use of surpluses for foreign relief and development.
- 1961 • Introduction of Gaines short-stem wheat, which permitted big increases in output through the use of fertilizer and irrigation.
- 1973 • Agriculture and Consumer Protection Act geared price supports for wheat, cotton, and feed grains to market prices.
- 1974 • World Food Conference in Rome drew attention to the need for improved agriculture throughout the world and for the better distribution of food.



A grocery store in the 1880's offered only staples and basic household items, but lots of town gossip.

(Continued from page 7)

operatives, they could benefit from quantity discounts, while if they sold cooperatively, they could bargain more effectively. A high point in assistance to cooperatives came with the passage of the Agricultural Marketing Act of 1929. This law established the Federal Farm Board to help cooperatives and corporations stabilize the price of cotton and wheat. Alas, the worsening economic situation doomed these stabilization efforts to failure.

Though more impersonal than its forerunner, the modern supermarket offers shoppers streamlined service and 7,000 to 8,000 items.

By the early 1930's, the Nation found itself in the paradox of having great surpluses of farm commodities, while city dwellers could not afford the food they needed. Some farmers, faced with the loss of everything they had, were on the verge of armed revolt.

The Agricultural Adjustment Act, signed in 1933 by President Franklin D. Roosevelt, gave the Secretary of Agriculture authority to reduce acreage or production by voluntary

agreements, to enter into marketing agreements with processors to control prices paid producers, and to license processors and others with the aim of eliminating unfair practices. Farmers could receive rental or benefit payments, and the Department could spend money to expand markets or remove surpluses. These activities were to be financed by a processing tax.

Then in 1936 the Supreme Court invalidated the production control provisions of the Agricultural Adjustment Act, in the Hoosac Mills decision.

Toward balanced abundance. Subsequently a farm law was passed which, with many modifications, remained the Nation's basic agricultural price support and adjustment law into the 1970's. It was the Agricultural Adjustment Act of 1938. It stressed an "ever-normal granary" plan of balanced abundance, with loans, acreage allotments, and marketing quotas for "basic" crops, and a goal of "parity" prices and incomes for farmers. Consumers were to be protected, and soil conservation was a major objective.

World War II led directly to the second American agricultural revolution—a technological eruption. This developed as a result of higher prices during the war, high levels of price support guaranteed for 2 years after the war's end, a seemingly unlimited demand for farm products, shortage of farm labor, and appeals by the Government to increase production.

Machinery moves to the fore. This second technological revolution saw virtual completion of the changeover from animal to mechanical power. The number of tractors on farms more than doubled between 1940 and 1950, even though the number of farms declined. By 1954, there were more tractors than horses and mules on farms. The tractor permitted mechanization of many other operations—tomato production and hay making, for example.

Foundations for the second revolution had been laid in preceding decades. New crops, breeds of livestock,





America's First Farmers

When Europeans first arrived in what is now the U.S., they found the native American Indians getting their food by farming, hunting, fishing, and gathering wild seeds and berries. Farming, both in extent and in what was produced, varied from tribe to tribe. But corn, or maize, was the crop basic to virtually all Indian farming.

First domesticated in Mexico, corn then spread north and south until it was grown in every section of the country. English settlers in both Jamestown and Plymouth were saved from starvation when friendly Indians taught them how to grow corn. This meant planting the seeds 3 inches deep instead of sowing them broadcast as was done with English grain.

The Indians cleared land for their corn by girdling the trees—cutting through the bark all the way around—until the trees died. Later the Indians removed the dead trees by burning them.

In many areas the Indians planted beans, squashes, and pumpkins with the corn. Strawberries and the Jerusalem artichoke were also cultivated. Had it not been for their natural abundance, blueberries, cranberries, and wild rice probably would not have been domesticated. While the potato, sweet potato, manioc, and pineapple were all domesticated by the Indians, these crops were not grown north of Mexico until after the Europeans arrived.

Tobacco was raised by Indians throughout the New World, and it quickly became the most important cash crop in colonial America. Several varieties of cotton were used by the Indians in pre-Columbian times. One of them is the basis for our short-staple cotton crop.

About half of today's total agricultural production in the U.S., measured in farm value, comes from plants domesticated by America's first farmers—the American Indians.

labor-saving machinery, and improved methods were available to farmers in the 1920's and 1930's. Lighter, more efficient tractors were introduced in the mid-1920's. Hybrid corn became commercially available in 1926. A mechanical cotton picker was patented in 1927. Meat-type hogs were developed by the experiment stations in the 1930's.

As in the period before the Civil War, however, many farmers in the 1930's lacked the capital or were reluctant to try new crops and methods with no assurance of gain and the possibility of losses. As Sherman

Johnson wrote in 1950, ". . . the production-increasing potentialities of improvements that were made over a decade, and that normally would have been diverted gradually into the production stream, were held back by the drought and depression of the 1930's."

Postwar progress. Conditions continued favorable to adoption of technology after the war. Continued demand for food for foreign relief and Governmental price supports encouraged farmers to greatly increase their use of mechanical power and machinery, fertilizer, feed and seed,

and other production items. And these became readily available when the shooting stopped. Industry, the State experiment stations, and the Department of Agriculture continued with research that would increase productivity per man-hour, per acre, and per unit of means of production or inputs. Innovations were adopted by farmers almost as soon as they came off the experimental plot.

The adoption of technology in the second agricultural revolution resulted in sharp gains in production, despite 50 million fewer acres of cropland and 9 billion fewer hours of labor being used. The following index numbers (1967=100) give an idea of the sharp changes:

	1950	1975	% change
Total farm output	74	114	+54
Output per unit of input	73	111	+52
Farm production per hour of farm labor.	34	136	+300
Land used for crops ...	111	108	-3
Labor used in farming	215	84	-61

In a pinch. The farmer's dependence on technology to produce for the market makes him very susceptible to what has been called the "cost-price" squeeze. The costs of what he has to buy have tended to rise faster than the prices he has received for what he sells. Even in such a period as 1973-74, when farm prices rose dramatically, costs of fuel and fertilizer rose even faster. And the increases in the price of feed grains hit the poultry producer, the dairyman, and the cattle feeder, causing them to cut back.

Even so, since World War II farmers who adopted the new technology, increased the size of their farms, and produced for the market—that is, commercial farmers—experienced a general upward trend in income and a rising standard of living.

While becoming a crucial part of the commercial world, though, they

continued to hold to traditional rural values. Most farmers believe that farming is essential to the well-being of the Nation, that it permits independence, and that it provides a favorable environment for the family.

Looking ahead. Potentials for further increasing crop and livestock production over the next decades include wider application of high-level management skills; hybrid varieties of wheat, barley, and soybeans; higher protein content in grains; insect-resistant plant varieties; improved breeding practices for beef cattle; multiple births in beef cattle; greater feeding efficiency; and double cropping.

Although many people have differing opinions as to the future of American agriculture, Theodore C. Byerly, an eminent scientist, wrote in 1970—"Continuing development and application of technology in pro-

duction of food, fiber, and forest products can supply the next generation abundantly."

Some forecasters see all farming in the hands of a few corporations by the year 2000, with practices being almost entirely mechanized.

However, farm population and employment have tended to stop declining for the past several years. And judging by farm financial data, farmers remain in good shape with their bankers. Furthermore, an indication that the independent farm family—whether organized for business purposes as a corporation or not—will be tough to buy out is the soaring price of farmland. It rose a fifth nationally in 1974.

Other forecasters predict increased irrigation, soilless or hydroponic farming, the desalting of sea water, the use of plankton as food, and the growing of edible protein on petro-

leum as necessary to meet the demands of the future.

Historically, changes in farming over the past 200 years have been so great that the Revolutionary War soldier-farmer would recognize only a few of the tools and none of the machines on today's farm.

A set pattern. If there is a third agricultural revolution it will likely be in the tradition of the first two—a major change in sources of power. It may well be a change from machines powered by fossil fuel—gasoline and diesel oil—to machines powered by effective small solar or atomic engines. However, while changes will continue in the future, our first 200 years have set a pattern. Food will still be produced primarily on the land by farmers responsible for their own decisions.

Astride his turn-of-the-century thresher, a Washington wheat farmer watches as the machine separates grain from chaff.



Four combines cut a quick swath through a field of grain sorghum in this typical harvest scene on the Texas High Plains.



from dreams of freedom, the declaration was nurtured also by a practical concern for the health of Colonial America's economic cornerstone: agriculture.

Farm-bred rebels. When Jefferson drafted the document, 9 out of 10 colonial Americans earned their livelihoods by farming. The Continental Army was commanded by Virginia planter George Washington. And most of the tough, ragged troops who weathered hardships at Valley Forge, crossed the icy Delaware River, and fought professional British troops, were farmers who had been aroused to drop their hoes and take up arms.

While time has proven the ideals of freedom that Jefferson so eloquently stated, the practical aim of many patriots has also been largely achieved: an American agricultural system unfettered from governmental oppression.

In 1776, the long tentacles of British law dipped deeply into the colonial farmers' pocketbooks and deprived them of trade opportunities with nations other than England.

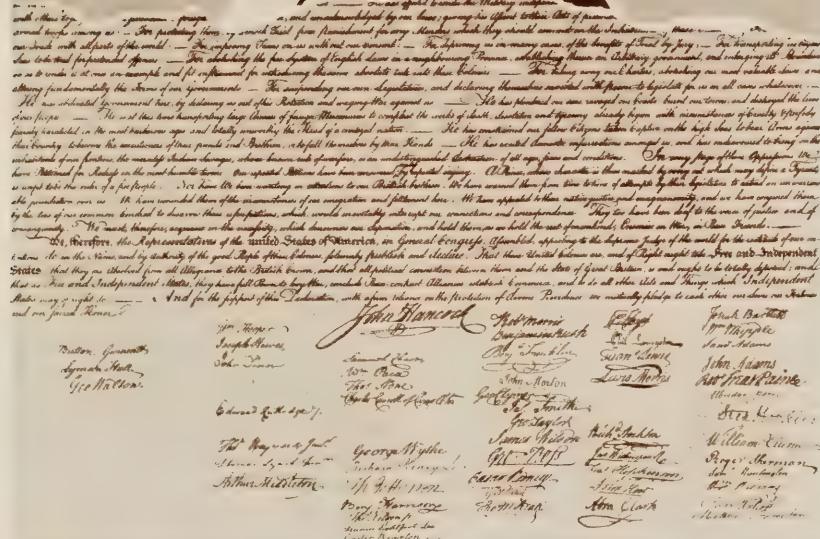
Feudal shackles. The typical American farmer had migrated to the New World in search of land. Even after he had acquired the land, the farmer bitterly discovered that the shackles of the ancient British feudal system followed him across the ocean in the form of three laws: the entail, the quitrent, and primogeniture.

Quitrents were a holdover from the days when serfs paid a yearly fee in lieu of other services to the lord of the manor. Colonial farmers were expected to pay the Crown or the land company a quitrent fee. Farmers, however, normally refused to pay the full amount, if any. But they felt harassed by collectors who attempted enforcement.

The entail was a requirement instituted by the original landowner that forbade his descendants from selling the land, thus ensuring that large estates would be passed on, intact, from generation to generation.

Eldest son favored. Primogeniture complemented the entail by designating the eldest son as sole heir of the estate, excluding other children.

The Farmer's Revolution



Scrawling their names boldly on a "treasonous" document that challenged the most powerful nation on earth in 1776, 14 American farmers helped chart a course for a free nation.

The Declaration of Independence was drafted by a 33-year-old Virginia

planter who, besides informing King George III that the colonies rejected British rule, asserted such radical ideals as "all men are created equal."

Thomas Jefferson's words have since been chiseled into stone for all free men to ponder. But while filled with soul-stirring phrases that rise

Thus, colonial farmers were disgruntled that their land was so regulated that they could not sell a small tract for a profit, or divide it among several children who had worked equally hard.

The farmer's irritation grew even greater with the Proclamation of 1763, after the French and Indian War. The proclamation forbade settlement of land west of the Allegheny Mountains.

To the British government, it was a sensible move to preserve peace with the Indians and to protect the vital fur trade. Yet, settlers were incensed because they were told to withdraw east of the line, abandoning land of great promise.

Speculators angered. Colonial officials were also miffed because many colonies claimed that their western boundaries extended well past the mountains. Some officials were even more upset since they were involved in speculative land development.

Several prominent Virginians owned the Ohio Company which claimed 200,000 acres on the Ohio River. George Washington was involved in such ventures.

While rivalry between the land companies was intense, they found one point of agreement: the proclamation hurt their business.

A new round of treaties with Indians in 1768 moved the line to the west, but the line never shifted fast enough to keep ahead of settlers.

Quebec Act. Perhaps the most galling incident occurred in 1774, when Britain tried to do a humane deed: the Quebec Act. The law set up a civil government for Quebec, granted religious freedom for French Catholics, ordered French law administered, and extended Quebec's boundaries to the Mississippi and Ohio Rivers.

Settlers, colonial officials, and land speculators were enraged by this loss of western lands.

Even without additional provocations, the farmer had plenty of cause to feel rebellious. Hopes of additional land were crushed by an imaginary line, and land that he owned was tied up in legal red tape.

Yet, trade provocations were even

more severe than those over land, from an economic viewpoint. The British smugly set up trade restraints that favored citizens of England at colonial expense.

Two types of restraints. These restrictions came in two basic forms: curtailment of trade with non-British markets, and taxation of exported goods.

The Corn Law of 1689 imposed stiff duties on goods shipped to England—the only market allowed. The Molasses Act of 1733 and the Sugar Act of 1764 taxed molasses and sugar that didn't originate in the British West Indies, thus curtailing trade between New England and the foreign West Indies.

New Englanders did far more than grumble. They set up a brisk smuggling trade with forbidden clients.

Other restrictions hampered the export of cattle to the West Indies, but western settlers, who produced most cattle, considered it only as a minor irritant. They were more enraged by the tendency of British colonial governments to ignore their needs and wishes, and by their lack of representation in government.

Southern problems. Southern planters were vitally affected by trade restraints. In 1621, Britain required that all tobacco must be shipped to England, where it was heavily taxed. To add to their woes, planters faced steadily decreasing yields as soil became depleted.

Taxes were also levied on rice exports. Rice, like tobacco and some other commodities, was allowed to be shipped only through England, where it, too, incurred taxes before being re-exported. A 1730 law modified this to allow direct shipments to foreign ports with payment of half the regular duty.

Indigo, the third plantation staple, received more favorable import status. England, the only market allowed, subsidized prices for exported indigo. Many grateful Georgia and South Carolina indigo planters remained loyal during the war.

Farmers lead revolt. With trade and land grievances in mind, it's little wonder that much of the Revolution's

leadership came from farms and plantations.

Of the 56 Declaration of Independence signers, 14 were farmers: Jefferson, Carter Braxton, Benjamin Harrison, Richard Henry Lee, Francis Lightfoot Lee, and Thomas Nelson of Virginia; Charles Carroll and Thomas Stone of Maryland; Abraham Clark and John Hart of New Jersey; Thomas Lynch and Arthur Middleton of South Carolina; William Floyd of New York; and Button Gwinnett of Georgia.

During the Revolution, as many farmers joined the army, others still tilled the soil. The war was an economic windfall for many farmers who supplied British, French, and patriot armies. Most farmers sympathized with the patriots, but British business was welcomed by some, especially Mennonite and Quaker farmers who opposed the concept of war and remained neutral.

Fiber industry grew. As a side benefit, the war gave farmers incentive to establish a fiber industry, since imports of British cloth were curtailed. Sheep, flax, and hemp became farm fixtures.

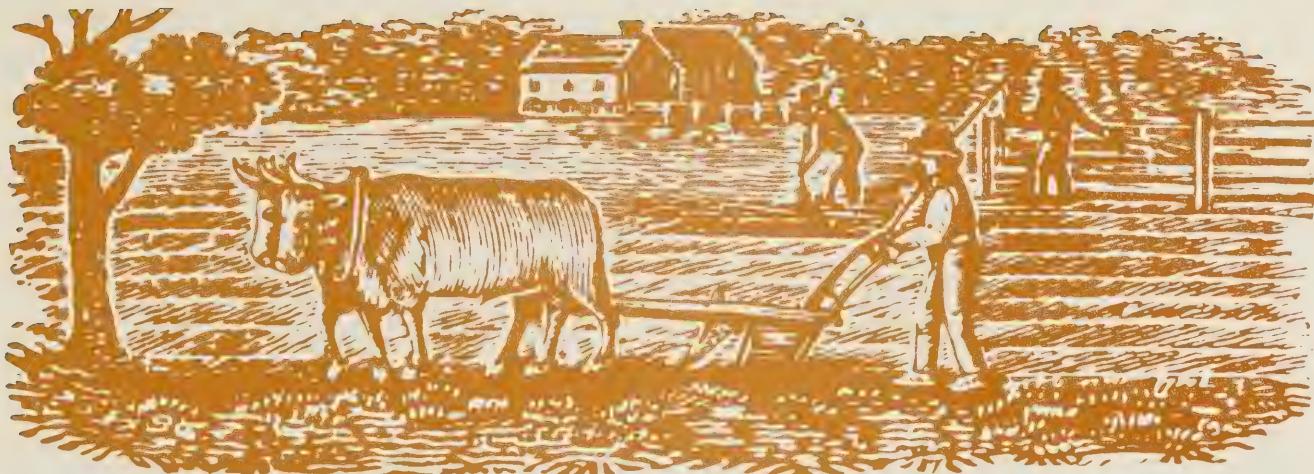
Bountiful crops continued to come in. Although the patriot army experienced severe food shortages sometimes, the problem was in buying and distributing food, not growing it.

After the war, British laws such as entails, quitrents, and primogeniture were voided by the victorious farmers. Imaginary barriers to western settlement were erased, and free trade with other nations was allowed.

Free trade became such a vital principle that when British warships persisted in harassing Yankee traders, the war of 1812 resulted.

Westward surge. As for the westward expansion, Virginia planter Jefferson bought the huge Louisiana Purchase area from France during his presidency for a mere \$15 million.

The great bargain assured the American farmer of vast fields of land stretching to the Rocky Mountains and including America's great Midwestern heartland.



White House Farmers

by Vivian Whitehead

The American Presidency is rooted firmly in agriculture through the farm ties of 22 Presidents.

The farm influence was naturally greater in the early years of the Nation when most Americans and most American Presidents were raised on farms.

The first farmer-President was George Washington, who was raised on a plantation in Virginia.

While Washington's fame is derived from his accomplishments as a soldier and statesman, historians generally agree that his first love was the development of his Mount Vernon plantation. Over the years, he made Mount Vernon a veritable agricultural experiment station. He kept records of different wheat varieties, became America's first mule breeder, and compiled America's first crop reports based on survey information.

John Adams, the second President, was the son of a Puritan farmer. His son, John Quincy Adams, was the sixth President.

Thomas Jefferson, son of a Virginia planter, established a successful, innovative plantation at Monticello. A great spokesman for agrarian ideals, Jefferson invented a side-hill plow and devised a moldboard that theoretically would turn the plowed

earth. He improved other machines and introduced rice from Italy.

James Madison was a member of the clique of Virginia planters that dominated early American politics. The son of a planter, Madison maintained a plantation at Montpelier, Va. Still another Virginia planter, James Monroe, operated the plantation Ash Lawn in Charlottesville, Va., near Monticello. His father was also a planter.

Andrew Jackson, son of a South Carolina frontier farmer, later established the plantation, the Hermitage, near Nashville, Tenn.

Martin Van Buren's father was a truck farmer and innkeeper in Kinderhook, N.Y.

William Henry Harrison was the son of a Virginia planter. He also operated a plantation. His grandson, Benjamin Harrison, became the 23rd U.S. President.

James Knox Polk, the 11th President, was the offspring of a farmer in Duck River, Tenn.

Zachary Taylor was the son of an Orange County, Va., farmer who moved to Kentucky when Taylor was a year old. Taylor became a planter.

Millard Fillmore was the son of a frontier farmer in Cayuga County, N.Y.

James Buchanan was the son of a merchant-farmer in Cove Gap, Pa.

Abraham Lincoln was born and raised on a frontier farm in Kentucky, and moved with his family to farms in Indiana and Illinois. As President, he strongly supported the agricultural reform of 1862 which resulted in the Homestead Act that opened great areas of farmland, the Railroad Act that established the Union Pacific Railroad, and legislation that provided Land Grant colleges and established the U.S. Department of Agriculture.

Ulysses S. Grant was the eldest son of a Point Pleasant, Ohio, farmer.

James A. Garfield was the son of an Orange, Ohio, farmer.

Theodore Roosevelt operated ranches in the Dakota Territory.

Calvin Coolidge's dad had a farm in Plymouth Notch, Vt.

Herbert Hoover, the first President born west of the Mississippi River, was the son of a West Branch, Iowa, farmer-blacksmith.

Harry S. Truman, the oldest son of a Lamar, Mo., farmer and livestock dealer, grew up on a farm near Independence.

Lyndon Baines Johnson was born on a farm in Stonewall, Tex., and later operated a sprawling ranch.

Surprisingly, only four Vice Presidents who did not attain the Presidency had farm ties: John C. Calhoun, John Garner, Henry A. Wallace, and Hannibal Hamlin.



This Land of Ours

by Orville Krause and William D. Anderson

In little more than a century, the pioneer farmer's ax and plow brought into agricultural use more than 300 million acres of virgin forests and almost as much virgin grassland, an acreage equal to all the land east of the Mississippi.

For most of that time, many of our forebears were going about the business of settling, developing, and exploiting this enormous land mass. It was not until the mid-1900's that

people really began to raise questions of how we should use this land.

By 1900, most of the land favorable for agricultural use had been developed. But we continued to irrigate dry lands and drain wetlands until 1920 when cropland acreage leveled off at about a fifth of the Nation's total land area. Grassland pasture and range make up a fourth of the total, forests a third, and wasteland an eighth.

Open space prevails. Despite a doubling of population, urban and transportation uses still take less than 3 percent of our total land area.

Furthermore, although cropland has been abandoned in some areas and developed in others, the pattern of land use has remained virtually unchanged for half a century.

Abandonment has been running at a rate of almost 3 million acres a year in recent decades. Most of it



The horse-drawn plows of pioneer farmers carved a vast acreage from virgin forests and grasslands.

has been in the States south and east of the Corn Belt, except for the Delta and Southern Florida. East of the Mississippi River, farmers worked the land too hard and reduced the soil fertility. And some of the terrain was not adapted to efficient use of machinery—fields were too small, rough, or isolated. In large areas of Oklahoma and Texas, farmers try-

ing to grow crops got blown out by dust storms, and wisely let that cropland revert to grass.

Adding new cropland. But elsewhere, farmers were adding acreage, almost offsetting abandonment. New cropland has been added at a rate of 1.3 million acres a year. Most of this came from drainage and irrigation in Florida; clearing and drainage in

the Delta; expanded irrigation in the Central Plains, California, and Washington; improved dryland farming techniques in Montana; and drainage, clearing, contouring, and leveling in the Corn Belt.

Irrigation development since 1900 has had a significant impact on agricultural output. Only 10 percent of our crop acres are irrigated, but they

The U.S. is rich in grazing land for livestock—a fourth of our land area is grassland pasture and range.





Snow-fed lakes and streams provide irrigation water for many mountainous regions in the West.

provide 20 percent of production. An additional 5 million acres of pasture are irrigated in the arid West.

Up to World War II, stream water provided most of the irrigation, mainly in the Mountain and Pacific regions. Since then, wells have taken over—particularly in the Plains States. Together, these regions today account for almost a third of the total irrigated acreage compared with only a sixth in 1939.

Water's biggest user. As a result of irrigation development, agriculture is the Nation's biggest user of water. Total national use amounts to nearly a fifth of the runoff supply (1,800 billion gallons a day). Agriculture takes a third of the total use for irrigation.

Homes, industry, and commerce account for the rest. They return most of the water to streams—only 5 percent disappears in use. But in agriculture, more than half of the water used for irrigation is consumed; that is, it disappears by evaporation or transpiration.

Irrigation accounts for only a third of total water withdrawn but 84 percent of that actually used.

There is great variation in water used by regions. Alaska has a third of runoff supply but uses very little. About 40 percent of the Nation's

supply comes from the Mississippi basin eastward. About a fourth is withdrawn but very little is consumed as almost all is returned to streams.

Irrigating the West. A fourth of the Nation's runoff supply is west of the Mississippi basin where most of the irrigation occurs. A third of this is withdrawn, half of which disappears in use.

Even in the West, the use pattern varies. In one irrigation region—from Texas to Nevada—two-thirds of the water supply is withdrawn and a third of the total supply disappears in use.

Such full use of the water supply can lead to problems. These include salinity problems—the accumulation of salt in the soil—and periodic shortages of irrigation water. Prob-

Out of the Wilderness

When the pioneers first began their work, forests covered about half of the land in the U.S. Two-fifths was in grass and herbaceous plants, and the rest was dry and barren.

They found most of the East to be a forest, broken only by the prairies of the Corn Belt and parts of Mississippi and Alabama. The tall grasses which extended from the Corn Belt into the Great Plains gave way farther west to short grasses adapted to limited rainfall. In the mountains west of the Plains, small scattered forests were interspersed with dry valleys and basins. The West had less than a fifth of the total

original forests of commercial quality.

Today our forest area is only two-thirds its original size. More than half of the eastern forest has been cleared for cropland, pasture, and urban areas. The commercial forests of the West have been reduced about one-fourth.

Much of the original tall-grass land of the Central States now produces crops and pasture. It is one of the most productive farming regions in the world. The better lands of the short-grass regions farther west are used for irrigated or dry-farm crops. The rest is used as grazing land for cattle and other livestock.

lems also are developing in some Central Plains irrigation areas where the water table has receded to a point that some irrigation has been discontinued.

Land in production. About 60 percent of the Nation's land area, including forest land grazed, is used for agricultural production. About 1 billion acres (47 percent) are in farms, a level reached about 1930. Another 300 million acres, mainly Federal rangeland, are used for grazing. Nearly half of our agricultural land was in use by 1870.

The billion acres of land in farms comprises cropland (44 percent), permanent grassland (43 percent), forestland grazed (6 percent), forest land not grazed (5 percent), and miscellaneous acres (2 percent).

About a fifth of the cropland is used for pasture, which produces almost as much forage as all other pasture and rangeland. The remaining 80 percent, or 385 million acres, account for the Nation's crop output. Cropland acreage has remained virtually unchanged for half a century.

Rising productivity. Until 1950, crop yields per acre showed only a slight uptrend. The rise in production came from additional acreage farmed. Nevertheless, production tended to run ahead of demand, and periodic surpluses occurred.

The agricultural revolution of the early 1950's changed things drastically. Productivity per acre increased two-thirds by 1972. Output was up 50 percent, even though the acreage set aside or diverted from crop production under Federal programs ranged from 37 to 65 million acres during 1961-72.

Output increased enough after 1950 to provide 37 percent more people with 9 percent more food per person, even though a fifth of our harvest was exported.

Production exceeded use in several years of the 1950's and 1960's and grain surpluses were a chronic problem. Now, however, grain stocks are down to minimum levels and the cropland set-aside program has been discontinued.



Drainage and irrigation ditches have improved much of our cropland.

Limited controls. Except for Federal programs to reduce production and promote conservation, problems involving the use of agricultural land have received little public attention until recent years.

Over the century in which Americans were bringing a continent into

farming use, the population was growing rapidly. Nevertheless, the country remained sparsely settled. With food supplies abundant and often in surplus, government control over land use was largely limited to laws governing nuisance and trespass.

Preliminary surveys pave the way for draining this wetlands area.



Control over land was, in fact, less restrictive than in colonial times when use and ownership of land were governed by the English feudal system. The crown served as a universal "landlord" and oaths and tributes were required. Dissatisfaction with the colonial land system was among the irritants that led to the outbreak of revolution in 1775.

The last vestiges of the feudal system were wiped out by the framers of the Constitution. Under it, owners had the right to treat their land as a freely marketable commodity.

Pressures for regulation. By the beginning of this century, however, many cities were becoming concerned with the impact of uncontrolled land use on health, safety, and property values. They sought and received authority from State governments to zone land and regulate subdivisions.

Accelerating urbanization brought land use problems into critical focus by the 1960's. This was intensified by growing public awareness of what pollution was doing to the environment. These concerns cut across a wide variety of interest groups, including farmers near metropolitan areas.

Interest in how land is used in rural areas has increased rapidly over the last decade, as indicated by the subject of zoning. All 50 States now authorize the zoning of some unincorporated rural areas. Rural land in three-fourths of the Nation's 3,000 counties can be zoned by some unit of local government.

Local authority. In general, power to regulate rural land use has been delegated to county governments in the South and West, towns or townships in the Northeast, and both counties and towns or townships in the Lake States.

Local governments in rural areas have been slower to exercise their authority than those in metropolitan areas. They also spend relatively less and employ proportionally fewer people on planning and regulatory activities.

The main authorities that have been used by rural governments are controls such as zoning, and incen-



Competing land uses: farmland gives way to industrial construction.

tives such as differential property tax assessments. Other forms of control include public ownership, fee ownership, fee ownership with leaseback or easements, contractual arrangements such as those used in cost sharing, and organizational forms such as special purpose districts.

Rural land issues. The list of emerging land use problems that directly concern agricultural and other rural lands continues to grow. It includes:

- Expanding needs for food and fiber.

Irrigation wells in the West turn deserts into productive fields.

- The need to keep productive soils in agricultural use.
- Control of urban sprawl.
- Improvement of air and water quality.
- Improvement of visual quality of the landscape.

Even though the supply of agricultural land remains ample in relation to our population, rural areas are certain to find land use issues more demanding in the future.

[Based on special material by Orville Krause and William D. Anderson, Natural Resource Economics Division.]

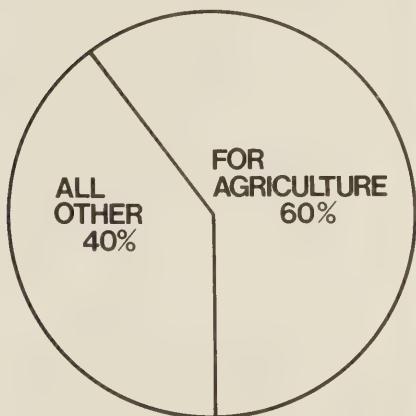
Nearly 3 million acres of cropland are abandoned each year.



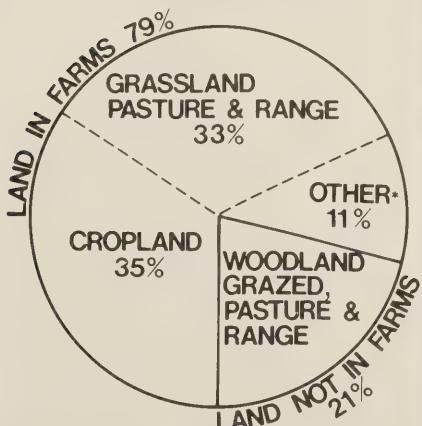


How We Use Our Land...and Water

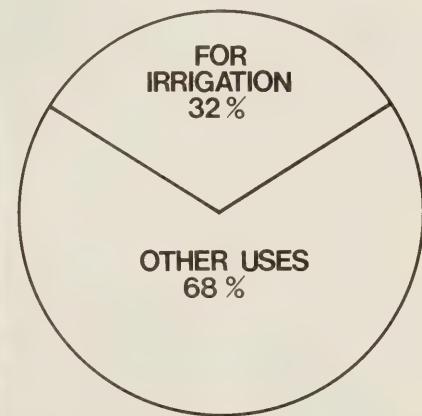
ALL LAND
2.3 BILLION ACRES



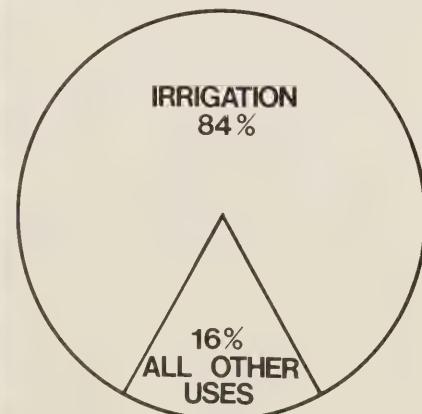
AGRICULTURAL LAND
1.4 BILLION ACRES



WITHDRAWN FROM
RUNOFF SUPPLY
370 BILLION GALLONS
A DAY



CONSUMED BY EVAPORATION
OR TRANSPIRATION
87 BILLION GALLONS A DAY





The Farmer & His Farm

by Donald D. Durost

The rich and versatile land and water resources of the U.S. support an almost infinite variety of agricultural enterprises.

Each year on the 1.3 million acres agriculture uses, 4.3 million persons apply their labor and skills to produce nearly 200 crops, hundreds of millions of livestock, and billions of poultry.

All of this results from the individual decisions of nearly 3 million farmers who decide what crops to produce, how many acres to devote to each, and how much livestock to raise.

In the driver's seat. Most of these decisions and the effort that turns them into reality are supplied by farm operators and their wives and kids. Only about a fourth of the agricultural labor force are paid workers.

That makes farming the only major industry in the U.S. in which family

members make up the largest share of the labor force. Even so, it's also an occupation where some of the people involved earn more money elsewhere than in farming.

Our farms come in a variety of sizes. They range from the small family farms with a few cows and chickens, a pig or two, a garden, and a few acres to raise food to sell, to very large farms of a thousand acres or more owned by individuals, cooperatives, or corporations and operated by managers and hired labor.

Who is a farmer? A farmer may run his own small farm or a 320-acre spread where he raises grain and livestock. He may be a cattleman who owns just a small acreage but rents a thousand acres of range country. He may operate a big farm for someone else, or be a sharecropper with a few acres.

Farms also differ in what they produce and where they produce it. Though some crops and livestock are found in all parts of the country, the kinds and amount vary by region. Soil conditions, climate, and even how far it is to the nearest or best market, influence decisions on what and how much to grow.

On the great bulk of farms, the operator also is the owner. The 1969 Agriculture Census showed that 86 percent of the farms were under sole proprietorship and accounted for 72 percent of the land in farms. Often a father and son own and operate a farm together.

According to the census, 13 percent of the farms were operated under a partnership (averaging 2.5 partners). These farms accounted for 18 percent of the land in farms. A large share of these partnership farms are

owned by members of a family.

Assembly line operations. We have other kinds of farms, too—such as the large, commercial farms that have an almost factory-type system of operation. Most are in California, Arizona, southern Texas, and Florida. Corporate farm arrangements, however, account for only 1 percent of the farms and 14 percent of the output. About 92 of these corporations have 10 or fewer shareholders, and probably represent family operations that have gone the corporation route to ease the transfer of holdings between generations.

One of the most striking trends over the past 2 decades has been the rapid drop in the number of farms. The 2.8 million at the beginning of 1975 was only half the number of 1950. The drop resulted primarily from the machinery and other technology that permit a farmworker to handle a much larger acreage than he could before. In recent years over half of the farms sold have been purchased by other farmers to enlarge their operations.

Big investment. Today's farmer may have several hundred thousand dollars invested in his farm. For example, for some typical one-man operations it may take \$200,000 for a 360-acre Louisiana rice-soybean farm; \$321,000 for a 1,950-acre Kansas wheat-sorghum farm; \$769,000 for an 800-acre Indiana corn-soybean farm; and up to \$611,000 for a 200-acre California vegetable farm. The largest share of the farmer's investment is in land.

Today, a farmer making his living only from farming must sell products worth at least \$20,000 to provide his family with a minimum level of living and some return on his investment.

Part-timers. It's obvious that not all farms produce enough to earn that much. But many farmers do not even try or want to do so. Some use their farms only for part-time operations or retirement residences. On the other hand, some factory-type farms bring in hundreds of thousands of dollars a year.

In the early 1970's about 35 percent of our farms had sales of less than \$2,500 a year. These account for only about 2 percent of our food. Some are retirement and part-time farms. Others are subsistence farms where family members are underemployed. On the average, people living on such farms receive more than 10 times as much income from off-farm work as from farming.

About one-fourth of the farms sell between \$2,500 and \$10,000 worth of products and account for about 8 percent of all sales. Few of these will provide a satisfactory level of living unless supplemented by other income. Farmers in this bracket receive twice as much nonfarm income as farm income. Income to all farm people from off-farm sources averages \$7,100 a year—more than the \$6,100 from farming.

Minimal living. Farms with \$10,000 to \$20,000 product sales account for 10 percent of sales and 13 percent of the farms. Farming is generally intended to be the main occupation of the operators, but income from these farms does not provide much more than minimum living standards and little or no return on investment. Nonfarm income averages four-fifths of the operators' farm income. This is considerably less than the off-farm share for smaller farm operators.

The rest of the farms, about 700,000, are gradually growing in number. These have gross sales of \$20,000 or more, and account for 80 percent of all farm product sales. Among these farms are more than 70,000 with sales of at least \$100,000 a year. They represent only 2 percent of the farms but have 38 percent of the sales—including about 70 percent of our vegetables, half of the fruits and nuts, and 55 percent of all poultry and poultry products.

To sum up, the average size of our farms is 385 acres; farmers sell livestock and crops valued at over \$23,000 per farm; and their average net farm income is \$6,100 a year.

Fewer enterprises. Farmers are becoming more specialized. A major change is the trend toward raising

fewer kinds of crops or livestock, buying more of the seeds and feed, and using more mechanical equipment such as tractors and milking machines. Today, the average farm has less than three major enterprises, compared with over five before World War II.

Although there still are some advantages to diversified farming, there are important reasons for specializing. It takes a high degree of skill and knowledge to compete successfully in producing just one farm product. A farmer who does well uses a knowledge of genetics, land and water conservation, and business management. Even the specialized farmer performs many different jobs with complex tools and machines. He combines science and machine power with the ancient art of tilling the soil.

High cost of farming. A farmer must also consider costs when deciding what to produce. Costs that must be met before he receives a return on his investment vary greatly by crops. For example, the cost per acre is \$23 for wheat, \$32 for soybeans, \$65 for corn, and up to \$150 for cotton.

His costs will average out to 75 cents out of every dollar of sales. The share varies, ranging from about 60 cents per dollar of sales on small farms to 85 cents on farms with sales of more than \$100,000 a year. As the farm gets bigger, the farmer must purchase more fertilizers, pesticides, gas and oil, and other nonfarm goods. And the larger the farm, the more hired workers he has to pay.

Customers of industry. Farmers are large purchasers of tractors, trucks, automobiles, and other equipment. They buy about 1 of every 8 trucks that are sold. In a recent year they spent over \$1.5 billion for tractors, \$1.4 billion for automobiles, and \$3.0 billion for machinery like plows, planters, and harvesting machines. And of course, as in other industries, these machines will wear out or become obsolete and have to be replaced.

Most crops have benefited from the increased specialization and the

greater spending by farmers for the latest technologies. For example, since 1950 corn yields have more than doubled—from 38 to over 90 bushels per acre. Cotton yields also have nearly doubled, going from 269 to 520 pounds. Wheat yields have risen from 16.5 to 32 bushels an acre and soybeans from around 22 to 28 bushels.

Risky business. Increased outlays are common to most industries, in keeping up with the efficiency-raising technologies. But farming parts company with most other industries when it comes to the income flow to finance those improvements. Farm income can fluctuate widely from year to year, and even within a season. One of the reasons is that crop production is not a continuous process. Usually it covers a period of only a few months in which crops can be badly damaged by weather, insects, or disease. Unlike most manufacturing industries, a farmer has almost no control over how much his farm will produce once the crop is planted . . . and almost no other industry is so beholden to such an unpredictable and widely variable factor—the weather.

Erratic price swings. Income variation also results from the wide swings in prices common for agricultural products. In 1970 farmers received \$22.70 per 100 pounds for hogs. This dropped back to \$17.50 in 1971 and then rose to \$39.30 in 1974. Similar ups and downs occur in the prices of other commodities. For example, feeder steers began 1974 at over \$50 per 100 pounds but wound up the year at less than \$30.

While his prices may fluctuate widely, prices of the things a farmer has to buy tend to go up steadily. This increases his already great risks. Some farmers, in an effort to reduce their risk, enter into informal agreements with other agricultural-related businesses like feed dealers and processors. Such an agreement may let the related business share in management decisions. These arrangements are called coordinated farming.

Various forms of farm and busi-

ness arrangements have existed for a long time in commercial fruit and tree nut production. Contract farming now accounts for about two-thirds of the vegetables produced for canning and freezing.

Hedge for poultrymen. Most of today's broiler production is a joint undertaking between farmers and processors. Men employed by the processor do much of the poultry farm management. Production is concentrated in operations that make the fullest use of labor-saving equipment. In this way, poultry raisers reduce their risks and get a guaranteed income.

The sugarbeet industry is another example of contract farming. Sugarbeets are heavy, bulky, and perishable. They are grown under contracts which guarantee a market for farmers and supplies for the processor.

Negotiated contracts tie the price of the sugarbeets to that of sugar. These specify the acreage to be planted, seeds and growing methods to be used, the dates the beets are to be delivered to the processor, marketing practices to be used, and even when the farmer will be paid.

Best record. Larger investments in technology and more specialization have increased the efficiency greatly. In fact, farmers have made the best record in this respect of all our industries.

Since 1950, the output per man-hour in agriculture has increased at a rate of nearly 6 percent a year compared with 2.5 percent for all other industries.

The rise in our agricultural productivity means fewer workers are needed to produce our food. In our country, there are 53 people for every 1 employed on farms. This compares with 16 and 23 in developed countries like France and West Germany. The Soviet Union has 5. In less developed countries like India and Pakistan there are less than 4 persons for every farmworker.

For city folks. What does all this mean to those of us who live in cities? Agricultural efficiency has helped raise our standard of living by providing abundant food at low cost in

relation to our take-home pay, leaving us more income for other things—houses, cars, college educations.

A second contribution of the continuing rise in agricultural productivity is the release of workers to other sectors of the economy.

The outflow of manpower from our farms has had social and economic costs, however. Many of the released workers are poorly equipped in terms of skills, education, and personal resources for nonfarm occupations. Some find the city has little to offer except unemployment benefits or low-paying, insecure jobs. As a result, many have added to the already existing problems of unemployment and poverty.

Farmers as spenders. A third benefit has been the creation of many jobs in the nonfarm sector of the economy. Farmers spend more than \$60 billion a year for goods and services to produce crops and livestock. Added to this, about \$15 billion goes for the same things that city people buy—food, clothing, and other consumer products and services. Nearly a fifth of the farmers live in town.

A fourth benefit of increased efficiency has been the farm family itself. The per capita income gap between the farm and nonfarm family has tended to close. In the 1950's the income per capita of the farm population was less than 55 percent of nonfarm, in the 1960's about 65 percent, and in the 1970's 75 percent.

Challenges ahead. What about the future? Farmers will continue to face the challenges of changing technologies. They will face the national challenge of improving our environment and overcoming shortages of energy. Challenges in the past have made today's farmers and their farms the envy of the world. Just as the Revolutionary War soldier-farmer would not recognize the tools and technology used by today's farmers, we can expect as great a change in the next 200 years. We too will not recognize the farm of the future.

Farming in Perspective



***The U.S.
would look
like this if the sizes of
States were proportional to
their value of farm production.***

*States ranked by
1974 cash receipts.*

FROM MUSCLE TO MA



(Smithsonian Photo)



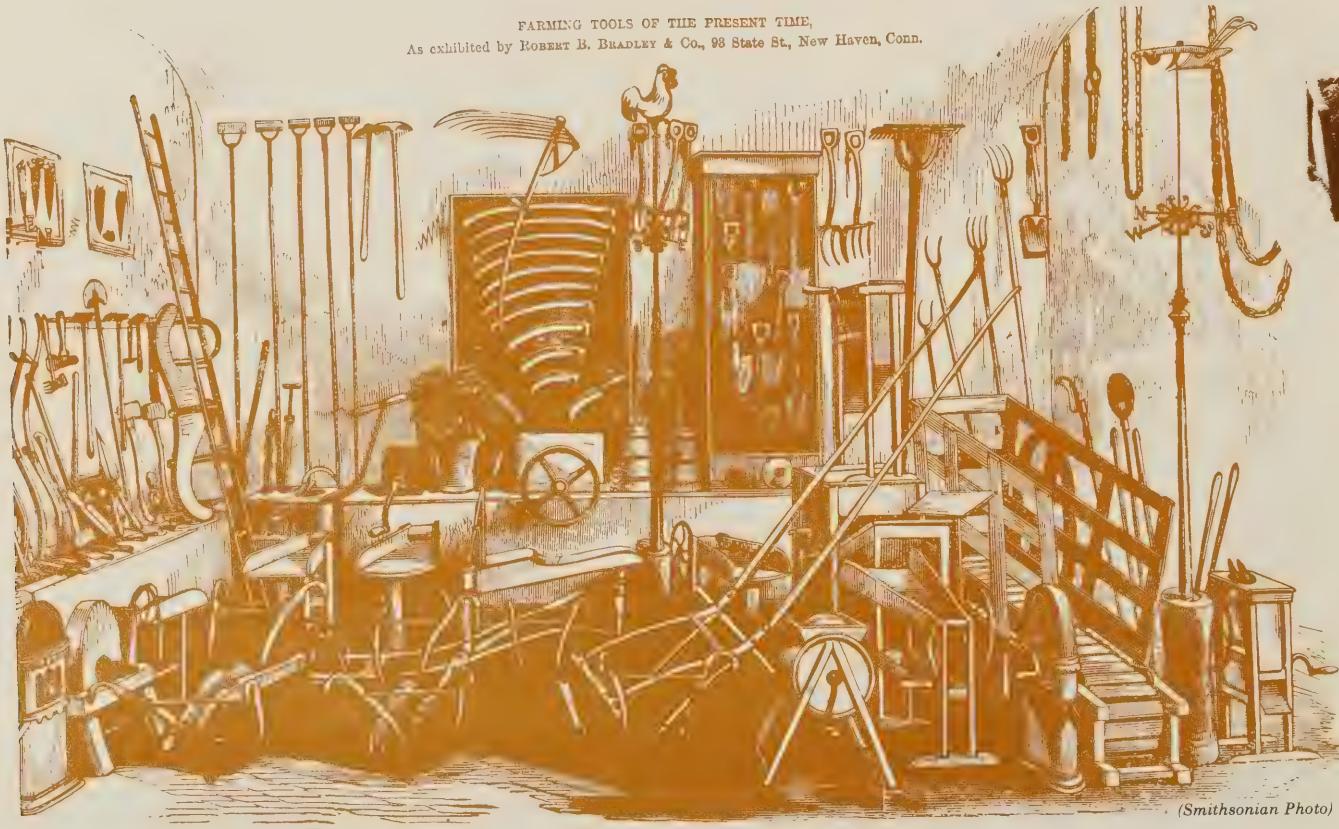
In the early 19th century, farmers fought the land with such tools as the horse-drawn cultivator (above), the Cary plow (right), and a wide assortment of hand tools (below). The hardships of farm life are evident in the nature of the tools.

Armed with the crude tools of age-old European agriculture, the American farmer battled the rugged land with sweat, muscle, and courage during the early years.

His hands were calloused and strong from the grueling, day-to-day labor. Farming was an occupation for the young and the strong, and for men and women with the will to endure hardships.

Perhaps incredibly, these are the tools that tamed the wilderness.

FARMING TOOLS OF THE PRESENT TIME,
As exhibited by ROBERT B. BRADLEY & Co., 93 State St., New Haven, Conn.



(Smithsonian Photo)

MACHINERY

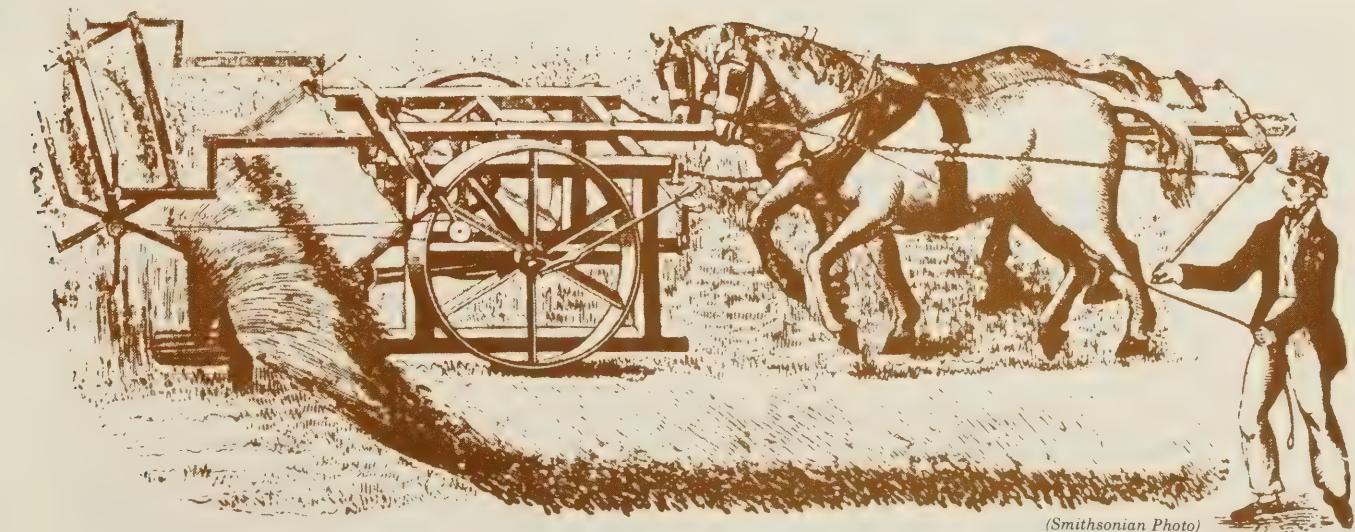
Then, minds sought relief for weary bodies by conceiving an array of machines.

The first machines were simple labor-saving devices, generally powered by horses, mules, and oxen. As needs became evident, minds set about meeting those needs. When prairie soil stuck to plows, new plows were quickly designed.

As years passed, machines became more complicated and more efficient until men sat atop machines while horses watched in wonder.

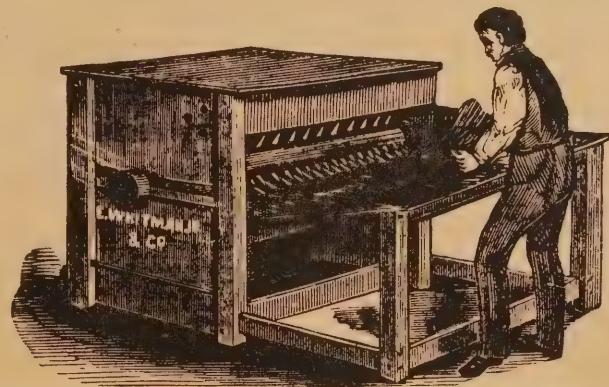


(Smithsonian Photo)



(Smithsonian Photo)

E. WHITMAN & CO'S Premium Iron Cylinder Thresher.



The teeth are set in spiral form or in straight lines, as may be desired by the purchaser. There is no difference in price.

E. WHITMAN & CO. manufacture and sell the only THRESHING DRUM in the world which will neither wear out nor break by use. After using one of these Drums one hundred years, it will be as good as new, and its superiority over others that are so likely to break by use, can readily be seen. It has also other advantages. Its speed is more regular, and consequently will break less grain than any other. It is also more convenient and runs with more ease, and is more pleasant to the feeder, as there is no dust blown from it to his face. These machines are known and in use in every State of the Union, and those "Old Fogies" who have been waiting for twenty years for one of these Drums to explode, will soon have to "give in" that their theory has exploded, and acknowledge our Drum to be the best in the world, as thousands who have used them in the last twenty years have testified.

Prices—20 inch Drum, \$50—24 inch Drum, \$60—Straw Carrier to either, \$15. We have also the common THRESHER, as good as can be had in the market, at \$35 to \$40.

E. WHITMAN & CO., 63 EXCHANGE PLACE, BALTIMORE.

(Smithsonian Photo)

Labor-saving machines soon evolved to provide relief and expand the harvest. The advertisement (above) appeared in The American Farm Advertiser, July 1859. The 1831 McCormick reaper (left) was the progenitor of that company's line. Less successful was Bell's reaper, an 1826 device putting the "cart before the horse."

On Tour With Agriculture

Welcome aboard! Your tour of agriculture USA starts in the Northeast and takes you through our 10 farm production regions plus Alaska and Hawaii. Meals will be served en route, courtesy of your host, the American farmer, who every year produces 3 tons of food for the average family. For all 213 million of us, that adds up to 160 million tons—enough to fill a freight train stretching 8 times the distance from New York to San Francisco. So, fasten your seat belt, loosen your belt buckle, and let's get going.

1 Northeast. The soil in these parts tends to be rocky and hard to farm, but this region still yields 6 percent of the Nation's farm output. If you hail from one of the big cities around here, chances are you drink Northeast milk (the area produces over a fifth of all dairy products), and dine on Northeast broilers, vegetables, and fruits. Farms number about 186,000 and average 169 acres.

2 Appalachia. Those leafy plants are tobacco, a top money-earner for Appalachian farmers who turn out four-fifths of the U.S. tobacco crop. Peanuts, cattle, and dairy products also rate high in the income ledger. The 481,000 farms in this region are relatively small—127 acres on the average—but they account for 8 percent of our farm production.

3 Southeast. Farms start to get larger again as we head south. Farmers here are big on cotton, peanuts, broilers, cattle, and fruits and vegetables. Down Florida way, citrus and winter vegetables dominate the landscape. Farms

number a bit under a quarter of a million, averaging 231 acres in size, and providing 7 percent of our output.

4 Delta. King cotton is the Delta farmer's favorite cash crop, but you see a lot of rice, soybeans, and livestock as well. This region has 202,000 farms producing 6 percent of U.S. farm production and averaging 231 acres.

5 Corn Belt. Turning north, we enter corn country, where fields are flat and fertile and nearly 60 percent of the land is in crops. About a fourth of all our farm products come from here. Besides corn—the No. 1 livestock feed—many farmers raise soybeans, wheat, beef, and hogs. The farm count is 624,000; units average 210 acres.

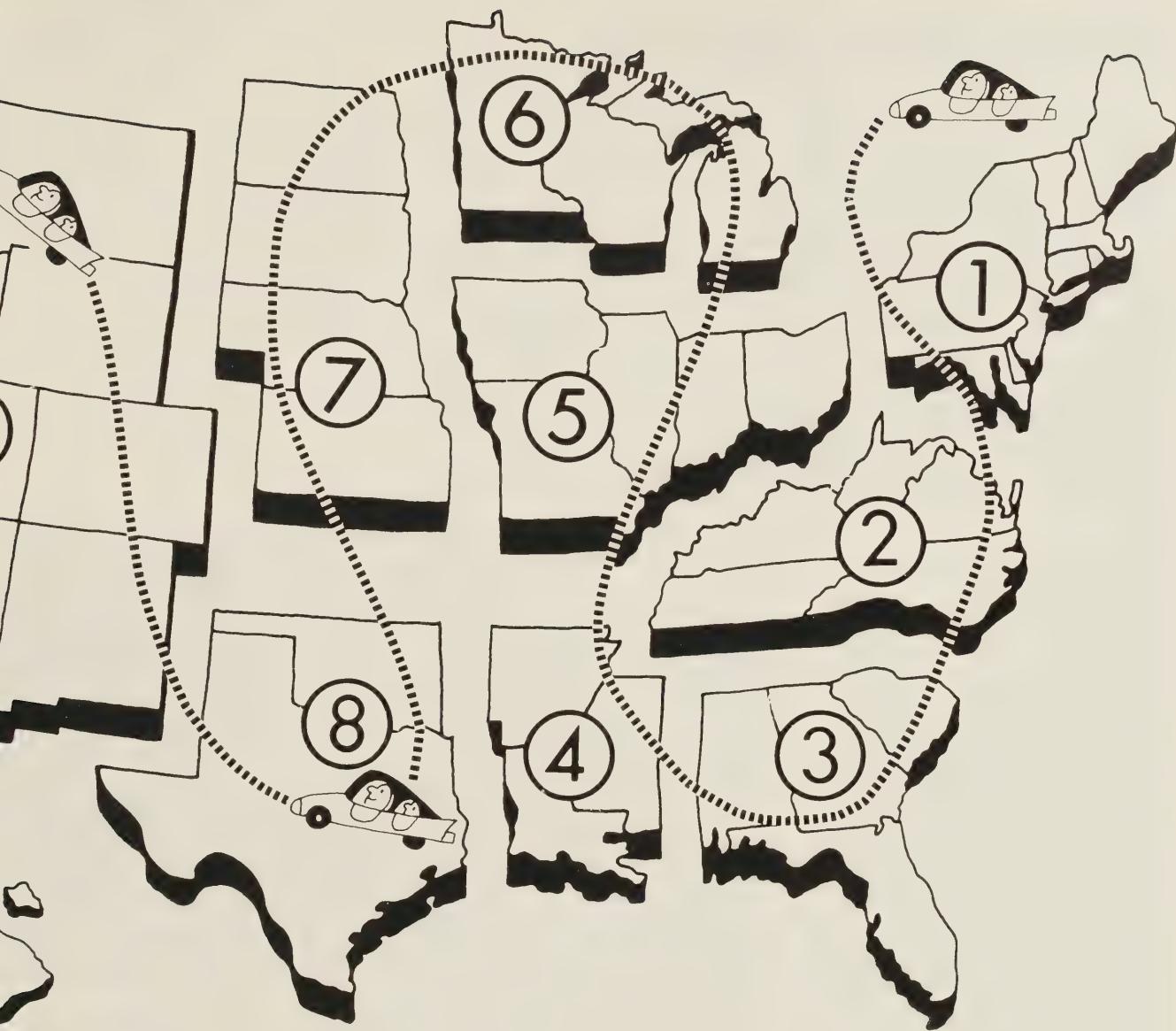
6 Lake States. Time for a milk break. Endowed with abundant hay, forage, and pasture, this region ranks first in milk production and gives us more than a fourth of all dairy products. It has 302,000 farms, which are about as big as in the Corn Belt.

7 & 8 Northern and Southern Plains. If bread is on your mind now, it figures. These two regions are America's breadbasket, growing over 60 percent of our wheat. Or maybe a juicy steak? There's no shortage in the Southern Plains, particularly in our No. 1 beef cattle State of Texas (it's also first in cotton). You probably won't be reaching for your umbrella on this leg of the trip . . . rainfall is sparse, causing farmers to put much land into fallow each year to assure enough moisture to pro-



duce a crop. Large farms are the rule in the Plains, from the Dakotas as far south as Kansas. They average 790 acres in Oklahoma and 605 in Texas. The Plains States together furnish nearly a fourth of our farm output.

9 Mountain States. Heading west, the level terrain yields to mountains and valleys. Vast expanses of this region are ideally suited to raising cattle and



sheep. Irrigation lets farmers raise an array of crops in the valleys, like sugarbeets, potatoes, and fruits and vegetables. Out here you need long legs to roam your property—the average farm has more than 2,150 acres, the most of any region. Farms and ranches add up to 121,000 and account for 7 percent of total production.

10 Pacific Region. Up north you find mainly wheat and fruits. The southern

part is the home of a large family of fruits and vegetables, grown in irrigated valleys and shipped throughout the country. Cattle are prominent also. Farms number 136,000, average about 530 acres, and claim 11 percent of national output.

11 Alaska and Hawaii. Jetting to the Union's newest States, you might be surprised to see so many vegetables

growing in Alaska—long summer days make this possible. Major foods produced by Alaska's 300 farms, however, are dairy and poultry products. On to Hawaii now for rest, recuperation, and a tall glass of fresh pineapple juice from one of Hawaii's 4,700 farms. A land of contrasts, Hawaii's few large farms raise pineapples, sugarcane, and cattle, though most farms average around 25 acres. The mild climate also favors bananas, coffee, macadamia nuts, and papayas.

Parade of Power

The tractor wins the cup in the parade of power on America's farms. Hitched to an eight-bottom plow, the modern tractor can cultivate and sow 100 acres in 24 hours. In George Washington's time a horse team plowed but 4 acres a day—and 1 of them went to raise feed for the horses.

When the new Nation was born, however, ox power often provided the only means to till the fields (photo 1), and manpower (2), to bring in the crops.

In the 1830's they rolled out the first McCormick reaper and improved it year by year (3). Revolutionary though it was, the reaper only goaded the farmer to set his sights higher when it came to mechanization. He needed something mightier than a horse to run the threshers and other belt-driven hardware.

Enter the steam engine (4) circa 1850. A giant step forward, but the first

steam threshers still had to be hauled from place to place by animals.

So, inventors went to work and developed steam tractors (5), some of which grew to be behemoths as manufacturers quested for improved traction on their models. One of the more bizarre creations (6) featured wooden covered wheels 15 feet wide by 9 feet in diameter and weighed in at 41 tons.

It took over six people to run these giants, not counting the waterboy and the farmer's wife who cooked banquet-size meals for the ravenous crews.

Reducing crew numbers, however, had to wait till the late 1800's and the internal combustion engine. Applying the principle to farm machinery, many equipment makers were building smaller gasoline tractors by the turn of the century. Henry Ford (7) made his experimental 1907 model from leftover parts of a Ford car.

The first general purpose tractor—for plowing, cultivating, and other chores—came along in 1924, and the first diesel-powered tractor in 1931. Also in the thirties, pneumatic tires



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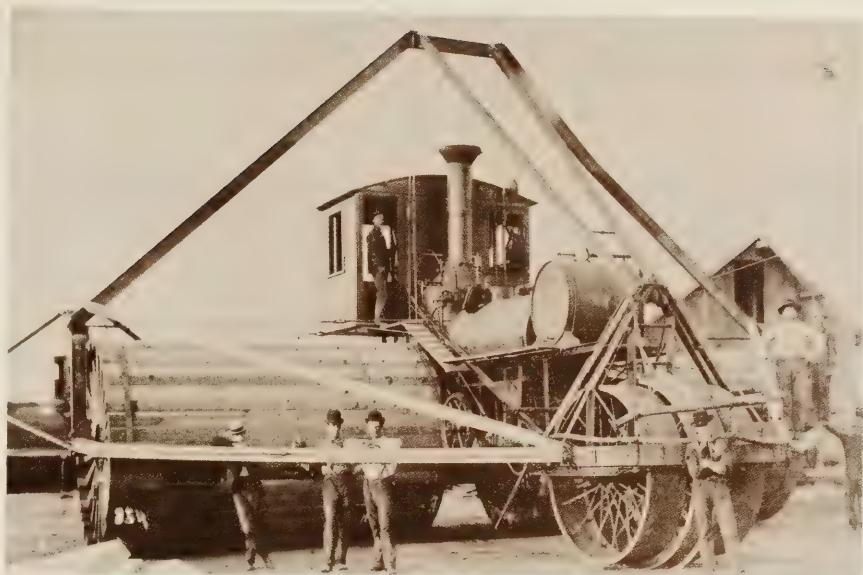
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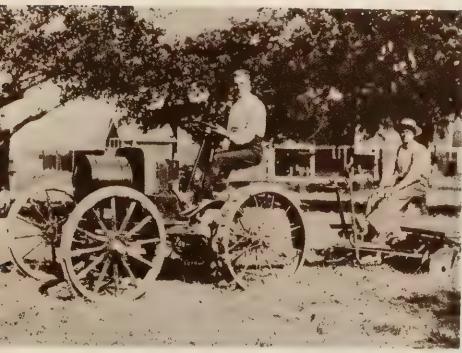
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began replacing steel wheels (8), and tractors carried motor lifts to raise and lower implements.

Advances slowed in the forties when tractor factories turned to producing materials for the war effort. But with the war over, the parade of farm power marched forward. Even more sophisticated machines made their debut . . . with more horsepower, engineering options and comforts for the driver . . . all designed to perform an even wider range of tasks for the progressive American farmer (9,10,11,12).



6



7



8



9



10



12

Different & Better Livestock..



Rhode Island Red, a 1930's broiler, ate 5 pounds of feed to gain 1 pound. Today's crossbred bird takes a little over 2 pounds.

That cantankerous little brown cow who barely gave enough milk, then kicked over the bucket, is only a fond memory to most folks now. In her place may well be a string of those docile, hulking black and whites.

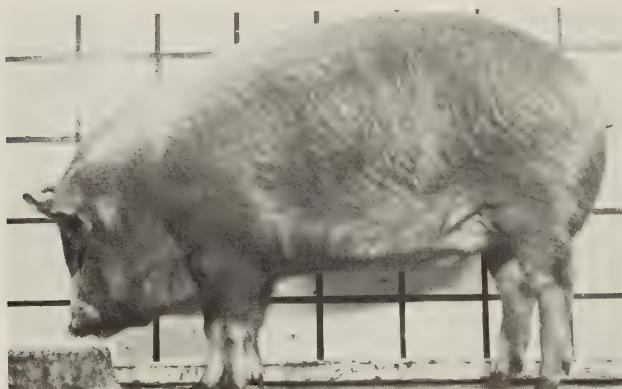
They're different from what your forefathers had to deal with, not only in looks but also in performance. A cow giving over 4,000 pounds of milk a year was exceptional back in the 1900's. Now the U.S. average output is over 10,200 pounds a year.

The chickens are different, too. In the 1930's it took 5 pounds of feed to coax a pound of gain on a broiler chicken, most likely a cockerel of an egg-laying breed such as Rhode Island

Red. Today's highly crossbred bird puts on a pound of meat for only a bit over 2 pounds of feed.

Sounds around the farm are even changed. The braying of Jenny is long gone, replaced by a descendant of the unique Poppin' Johnny tractor sound. Even your cow pony's clopping may be on the way out, replaced by the hum of a trail bike.

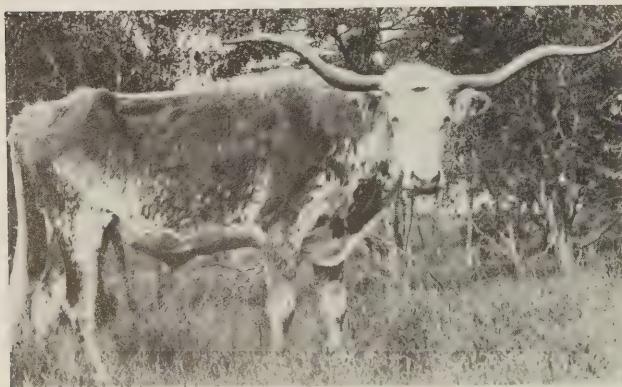
Moreover, the place looks different. Remember those neat shocks of milo that stood taller than your father? Today, their descendants are waist-high heads of hybrid sorghum, as uniform in rows as soldiers, awaiting the combine to yield 4 times the grain per acre that their forebears did.



A high-fat Duroc hog is typical of the hogs produced in the past. Emphasis was on fat as lard was in demand.



Today's Duroc produces more pork, less fat. It needs less feed per pound of gain than earlier breeds.



Grass-fed Longhorns, hardy animals built to withstand heat and drought, were beef producers of the 1800's.



Modern breeds like Herefords are feedlot fattened on corn and other grains. Beef is juicy and tender.

...Help Farmers Boost Productivity

Thanks to advanced technologies and labor-saving equipment, today's farmers are working less and doing more. In 1950 there were 2½ times as many farmers as there are today. Yet, in 1974, agricultural output was twice what it was 20 years ago.

In recent times, farmers have produced not only enough to feed the growing U.S. population, but to export an equivalent of 90 million acres of cropland as well.

Although there are half as many operating farms now as there were in 1950, the amount of farmland has stayed about the same. Over 55 percent of recent farmland sold was bought by farmers to enlarge their own operations. Farmers increased the size of their farms to make better use of the costly new machinery and to reduce the cost per unit of production. In 1950 the average farm was 213 acres. Today it's 385.

Today's farmer is more efficient than his 1950's cousin, increasing crop production by over 60 percent per acre. Improved varieties of crops and livestock and better uses of chemicals, fertilizers, and pesticides have all helped. But the main reason for his improved production record has been the shift to mechanization. Since 1950, manual labor has decreased by 40 percent, whereas the use of mechanical power

and machinery has increased by 30 percent.

Larger tractors, nearly twice as powerful as those used 2 decades ago, as well as other labor-saving equipment, have boosted the output per hour of work by 275 percent. For example, the man-hours required to produce 100 bushels of corn declined from 40 in 1950 to 6 in 1974; wheat declined from 28 to 9. Farm output per unit of input has shot up 44 percent.

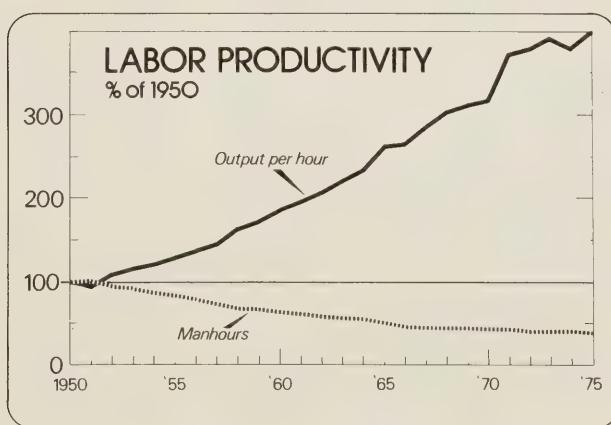
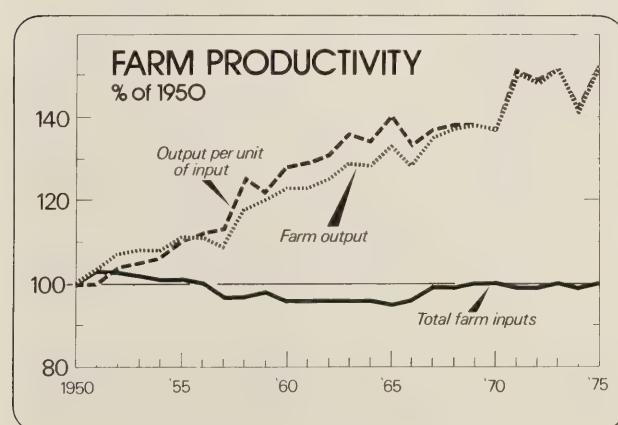
Along with greater productivity, farmers of the 1970's have larger expenditures. They purchase 70 percent more feed, seed, and livestock, and 3

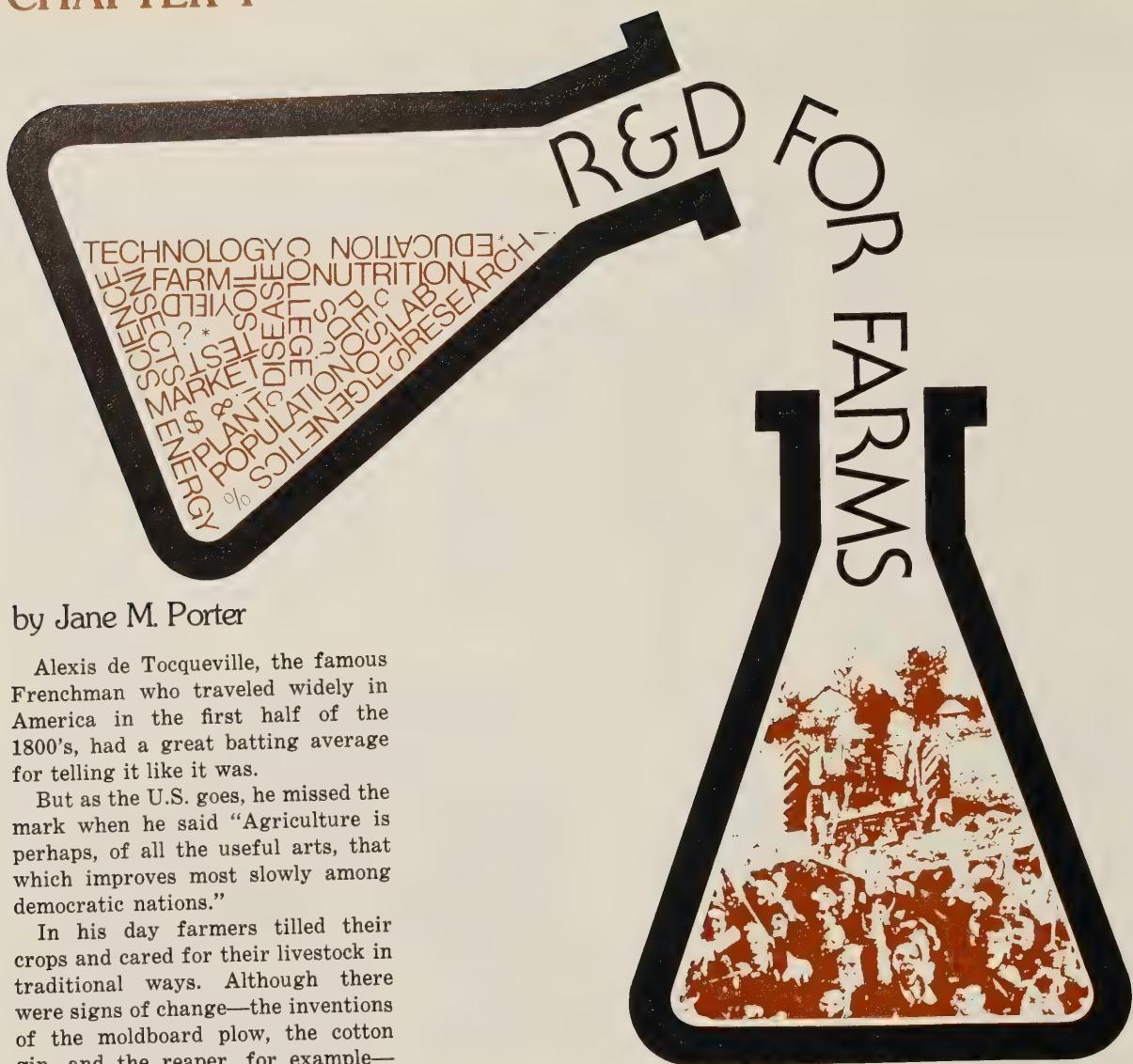
times as much chemicals, fertilizers, and pesticides as in 1950. As a share of all materials used by farmers, purchased inputs now account for over 60 percent, compared with about 40 percent in 1950.

Adopting all the modern technological advances available to him hasn't come cheaply for the present-day farmer. He has 7 times more real estate debt and 5 times more non-real estate debt than 2 decades ago. However, in spite of increased spending of capital funds, today's farmer remains in a relatively sound financial position with a debt-to-asset ratio of about 18 percent.

VITAL STATISTICS

	Unit	1950	1960	1970	1973-75
U.S. population	Million	152	181	205	212
U.S. farm population	Million	23	16	10	9
Farm numbers	Thousand	5,648	3,956	2,954	2,827
Farm output	1967=100	74	91	101	111
Total input	1967=100	102	98	101	102
Cropland used for crops	1967=100	111	104	98	106
Hours of farm work	1967=100	218	141	90	83
Farm output per unit of input	1967=100	73	93	101	108
Crop production per acre	1967=100	69	89	104	111
Farm output per hour of labor	1969=100	34	65	112	133





by Jane M. Porter

Alexis de Tocqueville, the famous Frenchman who traveled widely in America in the first half of the 1800's, had a great batting average for telling it like it was.

But as the U.S. goes, he missed the mark when he said "Agriculture is perhaps, of all the useful arts, that which improves most slowly among democratic nations."

In his day farmers tilled their crops and cared for their livestock in traditional ways. Although there were signs of change—the inventions of the moldboard plow, the cotton gin, and the reaper, for example—farmers still were slower to change than businessmen or industrialists of that period.

Hard to predict. We can forgive de Tocqueville for his lack of foresight regarding this one area. Indeed, few could have detected in the agriculture of the mid-1800's the sparks of the technological explosion that would revolutionize farming 100 years later.

Perhaps the greatest change is in the minds of farmers themselves, who eagerly seize and apply new technologies as fast as they leave the laboratories: new varieties, new fertilizers, new pesticides and herbicides, new systems of cultivation, new management techniques.

They welcome with equal enthusiasm new research findings concerning new uses for farm products, more efficient marketing and distribution, and improved technologies in transportation, storage, and processing.

This change didn't just happen. It was the direct payoff from a unique and massive effort over a 100-year period that created a vast network of agricultural research and educational institutions.

Among farmers' contact points for research information are the county extension offices in nearly all 3,044 counties in the 50 States, Puerto

Rico, Guam, and the District of Columbia. Each is staffed with one or more full-time professional agriculturists and home economists. The 11,500 county workers are backstopped by 4,500 State extension professionals. A small Federal office in USDA services and coordinates the State offices.

Extension helpers. In recent years, the Extension Services have employed a growing number of paraprofessionals who help disseminate information on nutrition, health, and family living to poor people in rural and urban areas. In addition, the

services use a legion of unpaid, trained, volunteer local leaders.

Research information also reaches farmers and the public through the press, radio, and television. Advertising is another means by which agribusiness firms communicate with farmers and others. Supplier firms themselves are also important distributors of new knowledge.

Research findings flow into this information network from a variety of sources.

First in research. Largest of the public research agencies is USDA's Agricultural Research Service (ARS). It operates 127 separate research establishments, including the Agricultural Research Center at Beltsville, Md., and laboratories in each of the States, Puerto Rico, the Virgin Islands, and several foreign countries. ARS also conducts research in cooperation with, or under contracts or grants with, State agricultural experiment stations, State departments of agriculture, and other groups both public and private.

Other USDA research agencies include the Economic Research Service, the Forest Service, and the Farmer Cooperative Service. Statistics on agricultural production and other subjects are collected by the Statistical Reporting Service.

Professional workers engaged in publicly financed agricultural research total about 18,500 man-years.

Private network. Data are not available on private agricultural research but it is believed to be roughly equivalent to that conducted by public agencies. Research staffs are maintained by practically all large manufacturers of feed, seed, fertilizer, pesticides, and farm machinery, and by firms engaged in transportation, processing, packaging, and merchandising of agricultural products.

Most of the technical and scientific people involved with this research and extension network were trained in the American system of publicly supported colleges and universities. None of these, of course, are exclusively agricultural schools. Only about 7 percent of the nearly 1 million students in these universities are

enrolled in agricultural majors.

Birth of USDA. The first major step in the development of the agricultural research and education network was the establishment of the United States Department of Agriculture in 1862.

At first the name was more impressive than the fact. The new Department consisted of a Commissioner, a superintendent of gardens, a chemist, entomologist, statistician, and several clerks. Its offices were in the basement of the Patent Office Building. The first experimental garden was several acres on what is now the Mall in downtown Washington, D.C.

The year that the Congress established USDA, it also granted each State a patrimony from the public lands. Proceeds from the sale of this land were to be used to establish agricultural and mechanical (A&M) colleges.

Humble beginning. The land grant colleges started small. In most cases, a farm was purchased and a single brick building was erected to provide classroom, laboratory, office, and dormitory space.

Farmers and State politicians didn't see the value of the A & M colleges right away, though State legislatures provided funds for buildings and sometimes for maintenance. For the first 30 years, the colleges had to rely primarily on the income from Federal endowments.

Then in 1887, the Hatch Act set an annual stipend of \$15,000 to support experiment stations at the colleges. The Second Morrill Act of 1890 provided further increases to an annual additional total of \$25,000 per school. Federal support for the experiment stations increased further during the first part of the 20th century, reaching \$90,000 per State by 1929. State support rose even more rapidly.

From famine to feast. The fortunes of the colleges swelled rapidly with the rise in farm prices during the first 2 decades of the 20th century. Funds provided by State legislatures increased and enrollment soared. For the first time, there were enough students to make up classes in agricultural subjects. By 1910, the colleges

were overcrowded, and some classes were held in stables.

The long gestation period gave the colleges time to learn some basic lessons. They found that publicly supported research must solve the problems of its constituents and that the solutions must be communicated to the public in usable form. They learned what the problems were. They also learned the value of systematizing all available knowledge on a subject before they broke new ground.

The experiment stations and the USDA also had to define and refine scientific method, acquire equipment, and develop terminology so that research could be verified and communicated to other scientists.

Laying the groundwork. The period from 1900 to 1930 saw two major developments that laid the groundwork for agricultural research and education as we know it today.

- Training of research scientists and technologists in fields relating to agriculture, including research in the social sciences which began before World War I.

- Training of communicators who could interpret and pass the know-how from the laboratory to the working farmer.

Public financing of communication was inaugurated by the Smith-Lever Act of 1914, which gave financial support for a nationwide system of adult education in agriculture and home economics. The Smith-Hughes Act of 1917 provided Federal money for vocational education.

Production revolution. Many of the more elementary scientific production problems of agriculture were solved during the first third of this century. More important for the long run, the research that produced the revolution in productivity after World War II was launched. It was to supply basic knowledge in genetics, human, animal and plant nutrition, and plant and animal diseases and pests.

The Extension Service campaigned to eliminate the diseases and pests that caused great losses to farmers. A campaign to eradicate barberries,

an intermediate host of wheat rust, was conducted during World War I—followed by successful efforts against bovine tuberculosis, Bangs disease, avian pullorum, hog cholera, and several others.

"Cow colleges." Despite their contributions, the land grant colleges, and especially the agricultural divisions, were slow to gain recognition as institutions of higher learning. Agriculture students sometimes were ridiculed as "hayseeds" who attended "cow colleges." To some extent this reflected lower admission standards and the high proportion of students who were not after a 4-year-degree course. It also reflected the fact that—agrarian mythology to the contrary—agriculture as an occupation ranked low on the totem pole until World War II.

The hard economic times of the 1930's bore heavily on the land grant colleges, experiment stations, and Extension Services. Whole faculties went unpaid or were issued State

script of dubious value. Critics demanded a halt to research because agriculture was over-producing; there already was a store of new agricultural knowledge sufficient for the next half-century, they said. Extension Services were branded servants of organized, affluent farmers and not entitled to public funds.

Rising to the occasion. The crisis also was a time of opportunity. The land grant colleges played a leading part in developing and implementing the agricultural programs adopted during the Depression. Many of the programs were devised by economists and sociologists on the faculties of land grant colleges and the experiment stations.

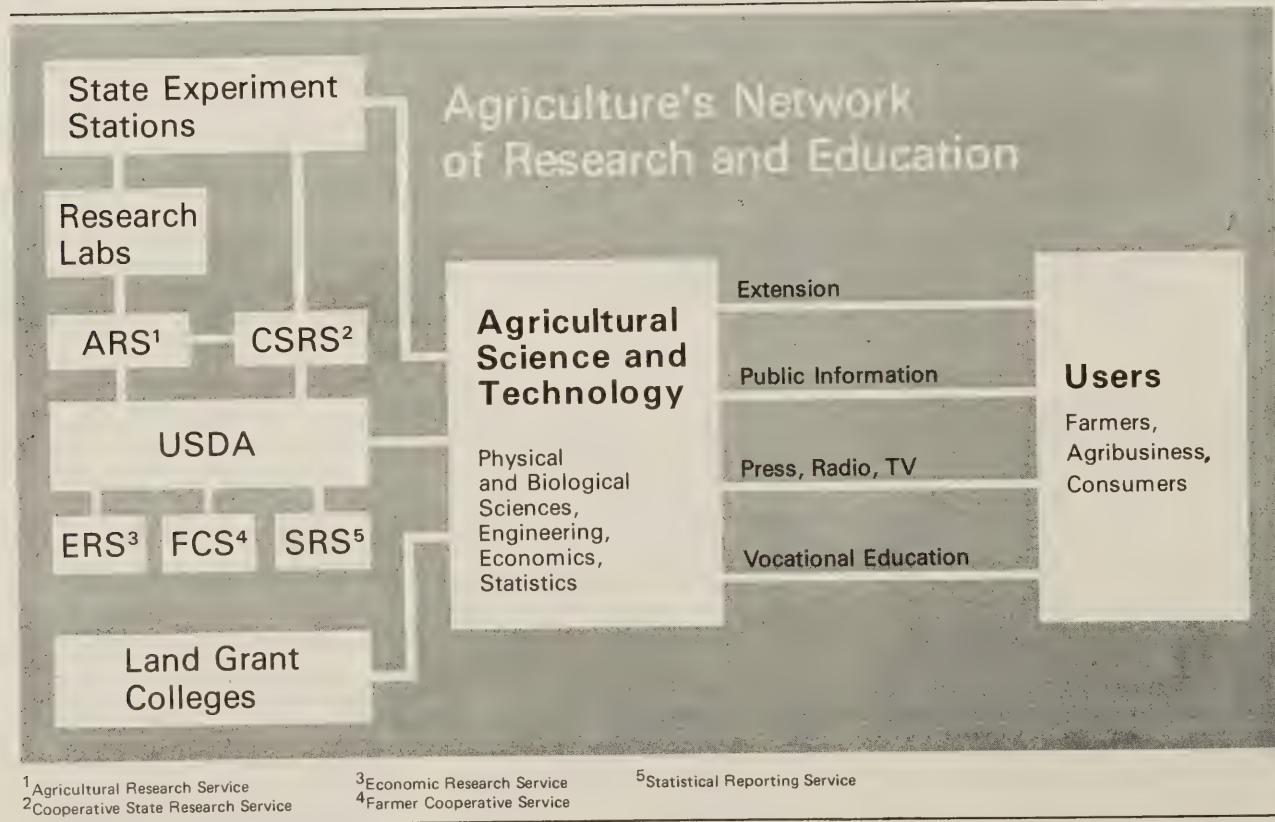
Extension was the only nationwide organization capable of carrying out the New Deal programs in short fashion. At the same time, funds received for administration of price support and production control programs saved the Extension Services of many States.

Payments to farmers under the new programs let them pay their taxes. In turn, the States were able to resume funding of services, including the land grant colleges.

New money. Agriculture received a new infusion of Federal funds through the Bankhead-Jones Act of 1935. It initially provided a \$1-million increase in research funds, to be raised by annual \$1-million increments to \$5 million. Forty percent of these funds went to Federal research and 60 percent to State.

Instead of being apportioned equally among the States, as in the past, the new funds were apportioned on the basis of the total U.S. rural population. A second feature required the States to match the Federal grants.

The provisions recognized that States with the largest rural populations were least able to support institutions to promote agriculture, and provided the least funds for agricultural research and education.



Half of the new funds authorized for Federal use financed establishment of nine regional laboratories which are administered by USDA in cooperation with the experiment stations.

Another deep well of funds for both Federal and State research was the Research and Marketing Act of 1946.

Working together. Cooperation between the State experiment stations and the USDA has been mandated by every agricultural appropriation act since 1887. Congressional committees are alert for evidences of wasteful duplication of research.

The experience of a century is that successful agricultural research and education is a long-time proposition. Although there are immediate benefits, major innovations require a long period for development. Even after a new practice is perfected, changing circumstances may postpone adoption.

Delayed impact. For example, the breakthroughs in genetics and chemistry in the first third of this century did not begin to appear in farming until the mid-1930's. The full impact was delayed by the Depression and the outbreak of World War II. The rate of adoption did not reach flood tide until the 1950's and 1960's.

Much of the backlog of reserve technology has now been put to use. This is reason for concern because of rising costs of research, shrinking funds, and the growing complexity of the problems. The cost of maintaining one scientist for 1 year rose from \$37,000 in 1966 to \$56,000 in 1973. Appropriations for research were cut back in 1972-75.

However, the U.S. has large staffs of highly trained, well-equipped agricultural researchers, communicators, and educators. This is a benefit of incalculable value as we enter a period in which massive problems of environmental pollution, energy conservation, and the pressure of population on the food supply move to the forefront.

Alfred C. True Institution Builder



Few have played a larger role in the development of agricultural research and education than the scholarly Dr. Alfred C. True, who headed the Office of Experiment Stations in USDA from 1893 to 1915 and the States Relations Service from 1915 to 1923.

True was an extraordinary institution builder. He worked closely with individual colleges as counselor and gentle critic, and with the Association of Land Grant Colleges and Experiment Stations.

For 35 years he was bibliographer of the Association. For 32 years he served as chairman of its Committee on Methods of Teaching Agriculture. He edited the proceedings of the Association from 1893 to 1910. He was dean of the Graduate School of Agriculture, a pioneering program to provide post-graduate in-service training for agricultural scientists. The school provided a gathering place for exchange of ideas and a forum for developing standards.

True prodded college administrators to free faculty from extension and teaching duties so they could

devote more time to research. He urged more "original research" and had that term inserted in the Adams Act of 1906, which doubled Federal funds for the experiment stations.

When True died in 1929, the triumvirate of institutions for service to agriculture was firmly established. The colleges were turning out enough graduates to staff the Extension Services, the experiment stations, the vocational agricultural courses in the secondary schools, and agribusiness.

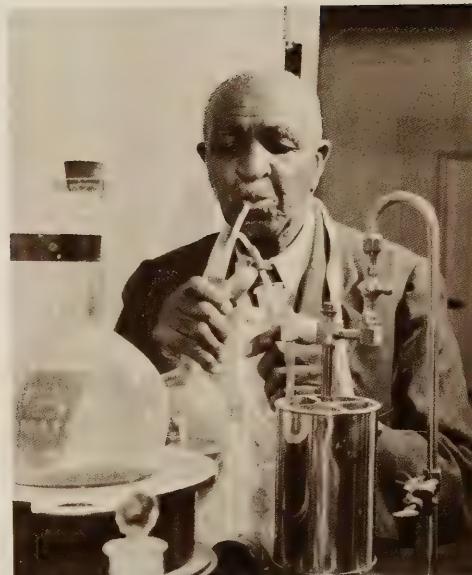
The experiment stations were contributing significantly to the growth of stable systems of agriculture in their States, and had made major breakthroughs in genetics, microbiology, organic chemistry, entomology and other fields. Extension Services had persuaded at least a million farmers there was indeed much to be gained from the practice of scientific agriculture.



From Plowshares to Computers

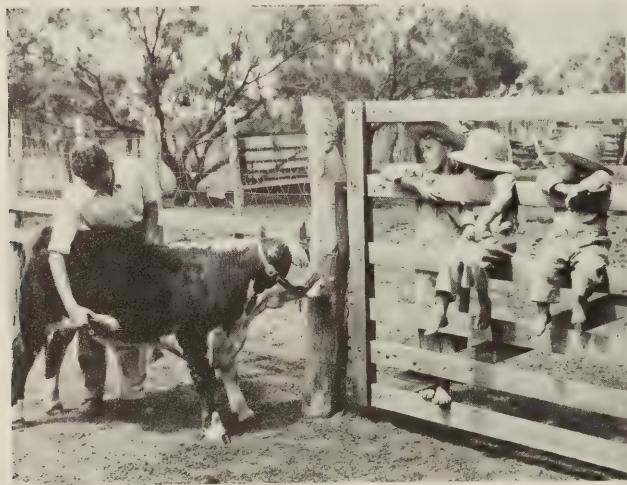


Pennsylvania State University, one of the first land grant colleges, consisted of only one building in the mid-1800's.



George Washington Carver: a pioneer in agricultural chemistry.

Kids have been active in 4-H Clubs since the early 1900's. Today, the Club has over 7 million members.



In a college laboratory circa 1900, students get the know-how to be passed on to the working farmer.



Maryland's Beltsville Center is the granddaddy of experiment stations.

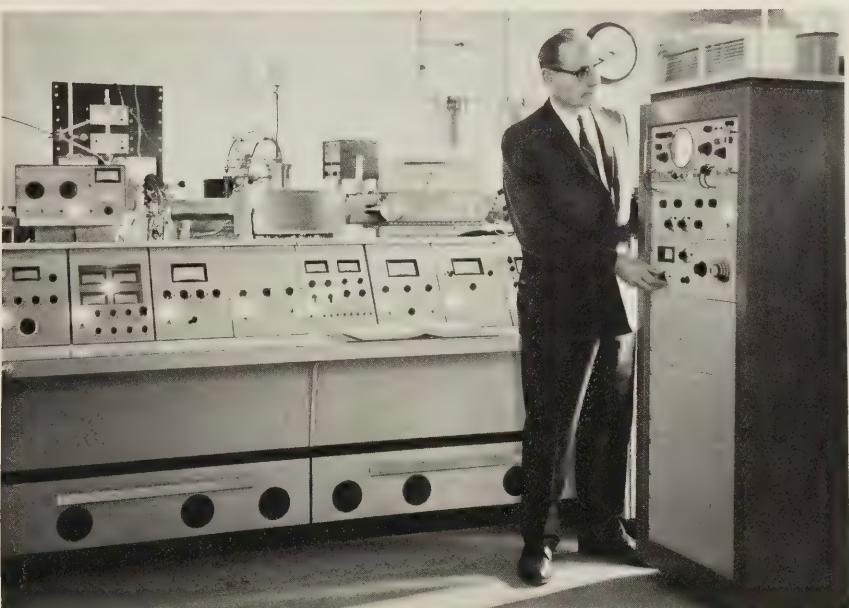
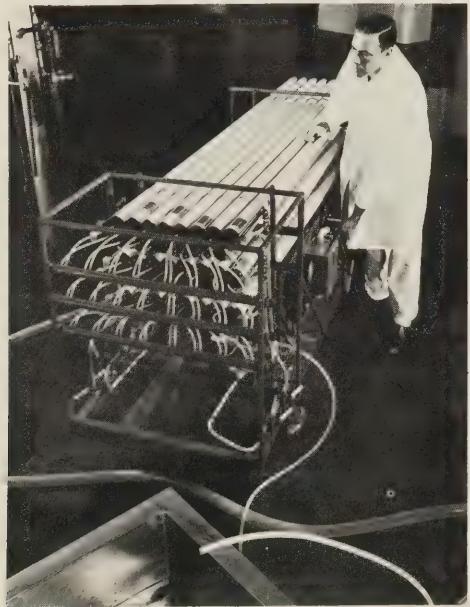


Researcher examines a flask for testing foods for salmonella bacteria.



Dating from 1876, the Morrow Plots at the University of Illinois are the oldest continuous soil experimental grounds in the U.S.

This machine converts whey—once a water pollutant—into nutritious food.



Entomologist with the Agricultural Research Service inspects modern equipment used to make chemical analyses of insects.

Wheat: R&D Case Study

In 1873, a group of Russian Mennonites immigrated to western Kansas, bringing with them wheat from their homeland in the Crimea. Although the "turkey" wheat prospered in Kansas and provided food and feed for the settlers, there was no market for it. Americans demanded light, white bread which could only be made from the soft wheats which grew in the East and Midwest.

The problem of the hard wheat challenged American millers. They discovered a mill which had been developed in eastern Europe, and used principally for processing sugar cane and manufacturing sheet metal. The mill had rollers which proved superior to flat millstones for grinding the hard wheats because they could be adjusted to crack off the bran without breaking up the inner starchy kernel. Successive grindings and siftings could then reduce the kernel into high grade flour.

This discovery set off a feverish pe-

riod of experimentation. Hundreds of patents were issued for mechanical purifiers, sifters, cleaners, dust collectors, and other milling equipment. One of these, the "middlings purifier," greatly facilitated the separating of the bran particles and increased the yield of high grade flour from a bushel of wheat. By 1881 the mills of Minneapolis, Kansas City, and St. Louis were ready to process a large volume of the hard wheat into bread flour by the new process.

As wheat acreage in the Great Plains increased, new problems arose—plant lice, saw flies, chinch bugs, grasshoppers, army worms, mosaic virus, smut, and worst of all, rust.

Research on wheat enemies was one of the earliest projects of the experiment stations of the Great Plains area. Researchers found that the genetic base of their wheats was too narrow. Mark Carleton, a wheat breeder at the Kansas State Experiment Station, was

sent by the USDA to Russia in 1900. He brought back about 1,000 varieties of wheat.

With these resources and a new understanding of genetics, wheat breeding began in earnest in the experiment stations and in the USDA. Desirable characteristics—such as disease, cold, drought, and lodging resistance—were bred into new varieties. Milling quality was improved. New methods of tillage and seeding were developed, and yields were increased.

But the research is far from being finished. The laws of survival of the fittest also apply to insect pests and disease microorganisms. They continually produce mutations that can survive and thrive on plants believed to be resistant to their species. If not detected early and stopped by newly developed resistant plants, they soon become epidemic. Most of the commercial wheat varieties in use today have been developed in the past 10 years.

Left: Russian immigrants brought their native hard wheat from the Crimea to America in the 1870's.



Today's improved U.S. wheats owe a debt to Mark Carleton's research.



Wheat breeding in many areas is now geared to boosting protein.



Transferring pollen is the first step in developing a new variety.

The Farm Family: New Viewpoints

by Helen W. Johnson

Two hundred years ago, 9 out of every 10 Americans lived on a farm. Today it's the other way around—more than 9 in 10 live in a town or city.

This has been one of our Nation's most momentous social changes—the

transition from a self-sufficient rural economy steeped in agrarian ideals to a highly industrialized urban society.

One result is that today the farm family lives more like its urban neighbors than ever before. Farm

families also are more likely to hold similar ideas, ideals, and customs.

The farm home looks like a single-family dwelling in town. The kitchen, laundry, and bathroom are much the same. But rural areas still have more substandard homes than elsewhere.

Practically all farms now have electric power, a car or truck, and a telephone. Radios and television are commonplace, and farm families tune in on the same programs as city families.

Today's farm resident has almost as many years of schooling, too. But he still falls short of urban standards for such services as health care, fire protection, and libraries.

Catching up. Income of farm families in recent years has averaged closer to urban levels than at any time in history. More of it, though, comes from wages and salaries and other nonfarm sources than from farm earnings. The

average farmer now gets over 40 percent of his total income from nonfarm sources. For smaller farmers—those with less than \$2,500 of farm sales—the percentage is as high as 93.

The urban trend toward commuting has caught on in the country. Many farm people drive to town for jobs. Or the reverse may be true: They live in town where public services are more readily available and commute to the farm. Thus, many combine town and country living with no conflict in lifestyle.

What has brought about these vast changes? They have come gradually over many years as new doors to the outside world have opened to the farmer and his family.

First mail service. One of them is so common that few city people would even think about it—the establishment of rural free delivery of mail, back in 1896. This not only



Circa 1930, one of the first electric dishwashers comes to the farm.



Modern ranch is well laid out with large, comfortable dwelling.

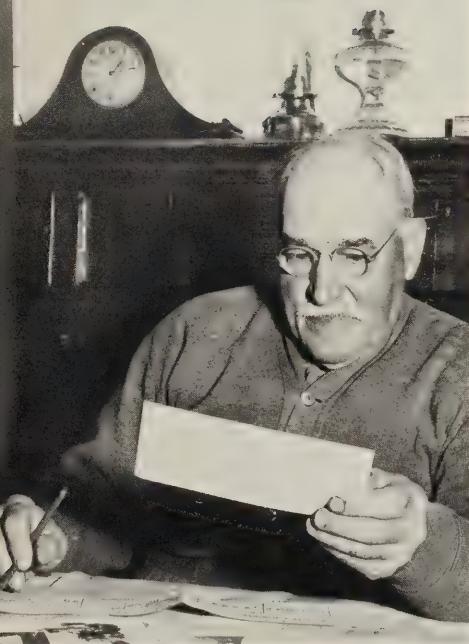
made it easier to send letters, but brought newspapers and magazines into many farm homes for the first time.

Another change was construction of farm-to-market roads, which made visiting with neighbors and trading in nearby towns much easier.

A third was parcel post service and the mail order catalog, which brought urban products to farm homes, often from great distances. This helped to lessen differences in urban and rural styles and tastes, and whetted the appetites of country people for other conveniences.

Electrifying impact. Electricity probably had the greatest impact on farm life. Even before electricity reached the farm, trains, movies, cars, and better highways were bringing changes. Later, radios, air travel, and television brought more.

Farmers became as mobile as their town and city counterparts, and were exposed to the news of



Farmer's "homework" includes filling out production forms for USDA.

the world and the same products of the market. The city reached out to the farmer with ideas, inventions, and other urbanizing influences. The barriers of physical and social isolation on most farmsteads became a thing of the past.

Friendly New Englanders. Of course, these changes took hold at different rates in different areas of the country and in different types of communities. New England farmers, accustomed to the township form of government from earliest times, were often closer to townspeople than their frontier brothers. They adopted innovations more readily, and alliances between town and country were more easily formed.

The unique plantations of the South were marked by their own kind of self-sufficiency. The plantation owner viewed the cities from a distance, not greatly concerned with them except as markets for cotton and tobacco, his chief cash crops and money-earners.



"Mom was right . . . green apples aren't good for little boys' stomachs."



Sloping roofs of New England farmsteads are ideal for winter snowfalls.



A farmhouse in Tennessee.

Isolationists. Then there were the pioneer farmers, gradually pushing the frontier farther west. They lived on isolated farmsteads. Their contacts with "city folks" were relatively rare, and often unfriendly, until the advent of modern communication and transportation. They were largely self-sufficient and had little use for learning about city people and city life. They felt they were the basic producers in the country and that everyone else needed them.

Dependent farmers. The changed nature of agricultural production

also pulled the farm family closer to the city. Commercialization and specialization have made farmers more dependent on the markets. The adoption of machinery and other modern technology has made them more dependent on dealers and stores for goods and services used in production. The growth in size of farms has created heavy demands for outside capital for investment and credit. So the modern farmer is more like a town businessman in attitudes and behavior.

Management skills. While farming still demands plenty of hard work



The pioneer spirit still exists today, as adventurous souls seek to wrest a living from the indomitable desert.



Wisconsin farmer shows off the latest in mowing equipment.



Roadside stands boost farmers' profits.

and mechanical and technical skills, management has become more crucial as operations have become more complex. A typical farm nowadays has hundreds of thousands of dollars invested in land, machinery, and stock, and produces much more than it used to. Managing the production, marketing, and financing on such enterprises demands more education and training, and of a different kind, than was the case some decades ago.

These changes in the home and business life of farm people have been the catalyst for altering beliefs, customs, values, attitudes, and institutions.

Agrarian ideals. The early agrarians attributed a moral value to hard work and a superior status in society to the farmer. At a time when 90 percent of our people were farmers, and were wresting a living from a virgin continent, it is not difficult to understand why they held these values. New land was there beyond the frontier when the old land was worn out. Markets for farm products were guaranteed by a growing population here and abroad.

Underlying these values and beliefs was a fundamental dedication to freedom—freedom to choose and follow one's own destiny. This agrarian idealism was a way of life which the farm family considered appropriate to a democratic, progressive, free society.

Shifting tides. The farm family of today still holds many of those traditional values and beliefs, but some of the agrarian ideals of the first century and a half of our history have been swept away by the swift currents of change in the last 50 years. Customs and behavior have also been strongly influenced by the shifting tides of events that have engulfed the whole country. Some values have been retained though modified; some have been lost or exchanged for others; and new ones have been adopted.

One of the most tenacious tenets of early agrarian philosophy is a



Sundays were family get-together days at the turn of the century.



Nebraska sod house, typical of the Plains in the 1800's.



Summertime meant canning time for the early-day farm woman.

Comforts of Home



Electricity? We had it long before I was born, says the 35-year-old city dweller. Farm boys take exception. In 1940 only 3 out of 10 farm homes were electrified, versus 8 in 10 for all homes in the U.S.

These days almost every farm home has electricity, and farm families enjoy the same amenities as urban people. For instance, about 9 in 10 farm homes have a telephone today, whereas fewer than 4 in 10 did just 25 years ago. And over 95 percent of rural dwellings have a TV set, compared with only

50 percent as recently as 1955.

In terms of substandard housing, rural areas have more than their fair share but the situation has been improving. The 1970 Census showed they had half the Nation's substandard houses (lacking complete plumbing or dilapidated), down from 56 percent in 1960.

Educationally, people in rural farm areas lag behind their city cousins, a median of 10.7 years of schooling in 1970—1.5 less than urbanites. In 1960, however, rural farm areas lagged by 2.3 years.

strong belief in the family farm. Although 95 percent of all farms are operated by families who supply most of the management and labor, the "family farm" today is vastly different from its forerunner. It is generally large, more specialized, less flexible, more akin to business and industry.

Other strongly held ideals are the belief in continuing progress through scientific and technical improvement, and dedication to freedom and democracy.

Modified goals. Although the ideal of freedom is held by farm people as tightly as ever, the goal of independence has been modified by

the growing link between farm and nonfarm people in production, processing, and marketing. Functions once performed on the farm have now been taken over by urban industry and trade. There are few self-sufficient farms in the historic sense, due to commercialization, specialization, and mechanization.

While agrarian beliefs and values were being altered or discarded, new ideas and concepts were being borrowed from urban society. Large commercial farms have been forced to adopt some of the methods of urban enterprises. The head of a large modern farm may contract for part of his work. He may also

own and operate a business, such as a feed mill, which is associated with the particular commodity he produces. He may have a contract with a company to market his output.

Success is foremost. A farmer may maintain an elaborate accounting system. He may incorporate his farm to obtain many of the same advantages of other businesses. His goal, like the town businessman's, is success.

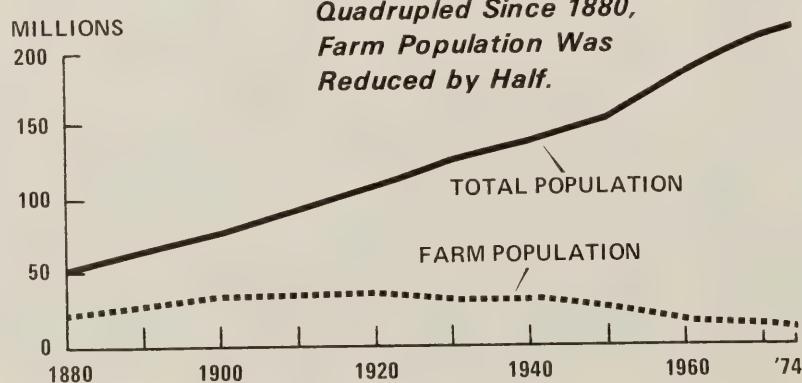
As interdependence of farm life with the rest of society has increased, cooperation has become more important than in the days of self-sufficiency and self-reliance. Cooperation among farmers to buy what they need or sell what they produce has been an effective means of reducing costs and getting better prices in a market economy.

Farm organization and professional farm leaders—farm-oriented but located in urban areas—have banded together with farmers to plead their cases to legislatures and nonfarm people. This kind of group action is not new, but has grown with the broadened scope and diversity of farm interests. It is an additional communication link between town and country.

Exceptions to the rule. Society has become more urbanized, and the differences between farm living and life in towns and cities have narrowed even more, although there are still exceptions. Farm life retains geographic and cultural variations as well as differences based on economic and social well-being. Customs, behavior, and institutions have roots in their own soil, and are not the same in New England, the Middle West, and Great Plains, and the South.

Nevertheless, the great acceleration of change, especially in the last quarter century, has affected all of society. It has largely rubbed out the differences between town and country living. Interdependence is the hallmark of the American people today.

Against the Tide: Whereas Total U.S. Population Quadrupled Since 1880, Farm Population Was Reduced by Half.



Yesterday's Farmer Looks at the Past

As part of our Bicentennial series, a former Minnesota farmboy takes us on a nostalgic trip to another era when farmhouses didn't have refrigerators or running water and a night on the town could be something as carefree as eating ice cream at a church social.

Elmer Starch has been in love with the land for as long as he remembers.

Born into a small Minnesota farming community in the summer of 1898, Elmer grew up on a family farm that raised dairy cows and crops.

Some of his happiest memories are from growing up on that farm in West Concord, Minn. "It was a really good, successful family farm. My father was very progressive. I didn't think so at the time, but he was. He bought the first hay loader in the community. Was al-

ways the first to buy any new machinery that became available. He was constantly reading. He kept up on all the new varieties of crops that came along. All his children went to school."

Bohemian heritage. Elmer's father, Stephen, immigrated from the tiny European country of Bohemia to Wisconsin and eventually married Frances Kunerth, a lovely young woman whose parents were also Bohemian immigrants.

In 1898 Stephen bought the Minnesota farm—240 rich acres for which he paid \$4,800. "It was on the fringe of the Corn Belt," Elmer recalled, "and pretty much in the Dairy Belt. We had quite a diversified operation—20 milk cows and selling about 25 pigs, 400 bushels of wheat, and 600 bushels of barley a year."

The farming community of West Concord was almost entirely Scandinavian in origin. The Starches were



With a razor-sharp memory, Elmer Starch recalls his early years on a diversified Minnesota family farm.

one of the few exceptions. "There were three Lutheran churches right around us," Elmer said, "but we were Methodists, and the nearest church was 7 miles away in the village." By horse and buggy, this was an hour-and-a-half trip.

Elmer remembers the children in the community attending summer school to study Norwegian. "It was similar to parochial school," he said. Although they were not Scandinavian, the Starches never felt any discrimination. "You were judged on what kind of people you were, not where your parents were from."

The farmhouse. The farm's crowning jewel was a lovely eight-room frame house, built by Stephen in the summer of 1898. There was more than enough room for Elmer and his four older brothers and sisters to spread out in this solid house with its large, airy rooms and cheery bay window.

There was no electricity in the community, and before Stephen sold the farm in 1918, the house was lighted first with kerosene lamps, then with Rochester burners, and finally, Coleman lamps.

There was no indoor plumbing either, but Frances did have a cistern pump in the kitchen sink, her "pride and joy," which provided soft water for washing and bathing.



Mr. and Mrs. Starch examine some old photos from Elmer's boyhood.

The only heat in the house was from a wood stove in the kitchen. Eventually this was replaced by a hard-coal model.

A spacious kitchen. The kitchen was the center of activity in the cold winter months, and Stephen had prepared for this by making it a large room, 16' x 16'. An adjacent 10' x 8' pantry gave Elmer's mother plenty of room for storing dry goods and preserves.

"The first stove my mother had was set on legs," Elmer recalled. "Six years after the house was built, my father bought her a really good range, with six lids and an overhead warming closet, where we dried our mittens. My father always wanted the best that was available."

The focal point of the living room was a large bay window with a good southern exposure for Frances' plants and flowers. "We had two carpets," Elmer remembered, "one for winter and one for summer. They were rag carpets, made from old clothes and linens. My mother would wrap the bits and pieces into big balls, and my father would take them into town to have them made into carpets. We used the new one in summer, and the old one in winter, because of all the snow and muddy feet." Frances had a hand operated vacuum cleaner to keep them tidy.

Young musicians. The living room also boasted an organ and two violins, which Elmer's sisters played. "None of the boys were ever musically inclined."

Stephen and Frances' bedroom was downstairs, and they had a beautiful brass and iron bed with a store-bought mattress, quite unusual at the time. "Most people had straw or corn husk ticks," Elmer said.

Four bedrooms were upstairs—one for each boy and one shared by the two girls. "My sisters were very clever," Elmer recalled. "They made coathangers by cutting metal barrel rims in two, covering them, and adding hooks."

Mouth-watering preserves. Most of the family's food came from a large

From Farmer to Educator

In the tradition of most Midwesterners, Elmer Starch has an affinity with the land. An intelligent, good-humored, articulate man, his personal adventures in agriculture have been almost as transitional as farm life itself.

Elmer spent a happy childhood growing up on his father's farm in West Concord, Minn. When his father sold out in 1918, he and an older brother bought a nearby farm and went into business for themselves. They farmed together for 5 years, until "prices dropped so much after the War that we saw there just weren't enough profits for both of us." So he quit the farm to get an education at the University of Minnesota.

After graduation, Elmer ventured into farming once again, buying a Montana ranch in 1929, but his principal work in agriculture took other forms. He was eventually named head of the economics department at Montana State College, teaching agricultural economics and farm

management. It was here that he got involved in a novel experiment that would shape his future.

Fairway Farm, the college's experimental farm, conducted studies on the land under unique conditions—Montana's semiarid climate. New equipment, methods of farming, and tillage procedures were tried out, and Elmer was in on all of it—observing, studying, writing.

In 1933 he wrote one of the first treatises on the introduction of mechanization to agriculture. It appeared in the book *Farm Management and the Agricultural Revolution*.

The knowledge he gained at Montana State, especially in dryland farming, eventually led him to other jobs—regional director of President Roosevelt's Resettlement Administration, foreign assignments with USDA and the Ford Foundation (including leading the Marshall Plan mission to Turkey in the early 1950's), lectures, and writing.

vegetable garden. For the winter months, Frances made preserves. Elmer remembered having over 200 quarts stored in their cellar, everything from raspberry sauce, to jellies, to elderberry syrup. Also 100 gallons of plum sauce from their own thicket—"The best I've ever tasted. To this day I can't eat a plain piece of bread without having something sweet on it." There were also vegetables, big wooden barrels of juicy pickles, and sauerkraut.

When the weather turned cold, Stephen would butcher a cow. The meat was packed in big ceramic jars between layers of snow. The jars were kept outside in the summer kitchen, an 18' x 30' building, the back of which was the woodshed and coal bin.

Multi-purpose building. "Along about May or June," Elmer said, "my

mother moved her cooking operation outside to the summer kitchen because she didn't want insects in the house. Also because of the heat. But in the winter, this was where the meat was stored."

There was also fried-down pork, which was kept in ceramic jars, layered in its own lard, and chicken. The only time the family had to buy meat was during threshing season, which began around the middle of September.

"The threshing crew wouldn't stand for pork," Elmer said, "so you'd have to buy additional beef. During this season, a local butcher would drive through the countryside selling beef from the back of a refrigerated buggy. It was a wooden contraption with a layer of ice in the bottom covered with sawdust."

One for all. Threshing in West

Concord was a community affair. One person owned a threshing machine, and on a rotation basis, crews made up of neighbors would visit each farm until the work was done. There was no pay, except for a huge noonday meal.

Transportation in those days really taxed the anatomy. Roads were unpaved and full of big potholes. It took the Starches an hour and a half to drive the 7 miles into town; with a loaded wagon it was longer. In 1914 Stephen bought a spiffy new Maxwell, the first farm-owned car in the community. Neither he nor Frances ever drove—the car was strictly for their boys.

The first excursion. "The car was delivered on a Thursday," Elmer said, "and on Sunday we planned to make a family outing to my sister's, 4 miles away. On Friday night there was a bad thunderstorm, and so on Saturday my brother and I decided we'd better examine the road and see if we'd be able to go. We started out, thoroughly studying every mudhole, and when we got through, we were a half mile from my sister's house. We walked home, got the car and drove. When we reached my sister's we found that it had taken us longer to drive than to walk."

The town of West Concord had three doctors, and they all made house calls, although someone had to go into town to get them. Claremont, 12 miles away, had a better doctor, and it was common for a farmer to drive to West Concord and phone the doctor in Claremont. The farmers organized a telephone company in 1910, and the Starches were among the first families to get a phone. "There were 12 families on our party line," Elmer said. "All that ringing used to drive us crazy."

Farm fun. Entertainment was largely a family or church affair, with ice cream socials, picnics, and visits. In 1913, Elmer's older brother, Edward, started the first Farmers' Club in their township. This organization, similar to the Grange, would eventually spread throughout the State.

The Farmers' Club filled a social

as well as political and educational function. In between monthly meetings, there were socials. Edward even coached a theatrical play each year, and had the younger children roaming about the countryside hawking it.

When rural mail delivery was started in West Concord, "in about 1904 or 1905," the Starches put up their first mailbox. The carrier had a 25-mile route, and in winter it was pretty rough going. "There was a bounty on gophers," Elmer recalled, "and you'd get 2 cents for every tail you turned in. You'd leave the tails in the mailbox, and the carrier would leave your bounty."

Keeping abreast of the news. The farmers were able to get several newspapers through the mail. The *St. Paul Dispatch* came twice a week, the *Kenyon Leader*, once a week, and the *St. Paul Farmer*, every 2 weeks.

Politics, both local and national, were second nature to the farmers of West Concord. Although the Scandinavians and non-Scandinavians in the community got along all right together, there was great discrimination between the farmers and the townsfolk. Having different interests, they often sat on opposite sides of the political fence.

A sign of protest. "When the Farmer Labor Party was started (in 1920)", Elmer said, "more than half the farmers in the community belonged. There was great friction between them and the merchants in the town. One year the Farmer Labor group had a picnic, and they decided to walk home down the main street of town. All the merchants drew their curtains as a sign that they were against the party. There was a lot of unrest."

According to Elmer, the biggest advance in farming during the years his father owned the farm was the discovery of a vaccine for hog cholera. "In those days, a farmer could lose his whole operation in one terrible blow," he said. "In 1914, my brother Edward had returned from vocational school at the University of Minnesota, where he had touched

on veterinary medicine. He inoculated all our hogs and the hogs of all our neighbors—about 20 nearby farms. People would come early in the morning and fetch him, and Edward would ride over and do the inoculations. He was known as the 'needles man' among the people in the community."

Better producers. Another thing Edward was responsible for was improving the line of cows on the family farm. "When Edward came back from school," Elmer said, "he knew there was a difference in milk cows, that some were just naturally better producers than others. He instituted a system of weighing the milk, where you'd hang the pail on a spring scale. Every day you'd write down how much the milk weighed for each cow, and at the end of the month you'd tally the figures. Using this method, we were able to weed out the poor producers.

"We established two cows that were good producers, Josie and Molly. We kept all their female offspring. Josie became the ultimate parent of the entire herd. Within 10 years we had all good producers."

Like father, like sons. When Elmer's father sold the farm, the two brothers bought a farm 12 miles away. In the 5 years that they farmed together, they continued the progressive trend started by their father, at one point selling two horses to buy a steel-wheeled tractor. Edward still has the farm today.

Elmer's early experiences with farming, first on his father's farm and then with his brother, helped shape his opinions of farming today. A strong advocate of the family farm, he's against corporate farming and huge one-man operations.

The scientific and technical advances that have taken place since Stephen Starch owned his farm have been overwhelming. And as a result, "farm life was able to overcome its isolationism, its drudgery. There's been a systematic advance out of peasantry."

[Based on an interview with Mr. and Mrs. Elmer Starch, now living in Washington, D.C.]



Women in Agriculture

by Vivian D. Wiser

Women are agriculture's unsung heroes. Historians have largely ignored their contributions—probably because plowing a field, slopping hogs, churning butter, making soap, emptying chamber pots, and washing work clothes don't seem like great achievements. Nevertheless, their willingness to do tiresome but necessary chores has kept many a farm business from going under.

Farmwomen worked especially hard in pioneer days. One account of life in Dutch New Netherland (now New York) circa 1625 tells of the men spending their time hunting, while the women were left to tend the farm and do the housework, not to mention caring for the children.

More than 2 centuries later, most farmwomen were still doing more work than their husbands. An 1862 report from the newly formed USDA said that on 3 out of 4 farms "the wife works harder, endures more, than any other on the place." Unfortunately, the report offered no solutions to the farmwoman's lot. The author simply said that husbands could and should remedy this situation, and that a

mother "should train her daughters for marriage and her sons in giving their wives proper treatment."

Although most early women settlers labored on small farms with their spouses, some Southern women managed huge plantations, especially during the Civil War when many fathers and husbands went off to battle.

Without their men, farmwomen in both the North and the South returned to the fields—running mowers, reapers, rakes, drills, and plows—cared for livestock, milked cows, and made butter and cheese. These women literally fed both armies.

Women's role in the Grange. After the Civil War, a number of farmers' organizations were formed in which women played an active role. The National Grange, born in 1867, realized the importance of the family unit. Women held several offices during the Grange's early years. Members such as Mary Anne Bryant Mayo of Michigan went about lecturing and urging other women to get involved in social and educational activities.

In 1892 the Grange voted to give Caroline Hall equal status with the seven male founders of the organization. Miss Hall had held various positions in the Grange, including first Ceres and lady assistant steward.

"Patrick Henry in Petticoats." Another leader of American agriculture was Mary Elizabeth Lease, who became associated with the Farmers' Alliance movement. Admitted to the bar in 1885, she developed a gift of oratory that she used in support of Union Labor candidates during the 1888 campaign. Two years later she made some 160 speeches for the Union Labor Party, including the famous: "What you farmers need to do is to raise less corn and more hell." Called the "Patrick Henry in Petticoats," Mrs. Lease was well received in the Midwestern States, sometimes making as many as eight speeches a day.

Joining the lecture circuit. A number of women became adept public speakers through their affiliation with the National Grange and other farmers' institutes organized by agricultural societies, State boards of



The Farmettes of World War I helped the war effort by working on farms.



The farmwoman's workday never ended til she had done the evening milking.

agriculture, State colleges of agriculture, and experiment stations. Women lectured to both men and women on such subjects as food preparation and diet as well as general agricultural topics.

Women participated in the formative meetings of the American Association of Farmers' Institute Workers, begun in 1895. However, once the organization was on its feet, the men voted—against strong opposition from the women—that the women must have separate meetings. A committee was set up to work on

women's institutes. But due to stiff competition from the Homemakers Association, canning clubs, and extension home demonstration agents, the institutes were disbanded during World War I.

Government becomes concerned. Various organizations at the turn of the century were concerned with upgrading rural life, food production, and nutrition, but not until 1908 did the Federal Government get into the act...to the betterment of women. President Theodore Roosevelt ap-



Music was a refuge for many women after a hard day's work on the farm.



Women worked in groups to make chores like mattress-making fun.



A home demonstration agent gives these women some pointers on canning.

pointed the Country Life Commission. The report of the Commission in 1909 discussed women's work on the farm and concluded that "relief to farmwives must come through a general elevation of country life." Such improvement would give women time to participate in vital affairs of the community.

Few modern conveniences. The role of women in agriculture continued to be a topic of discussion and study. A survey taken about 1912 showed that few farmwives enjoyed modern conveniences in their homes. Only 57

percent had oil stoves; 15 percent had furnaces; 33 percent, hand-operated washing machines; 10 percent, washing machines run by engines; and only 11 percent had drinking water in the house. The survey also found that women were working in the fields, doing some of the most back-breaking chores.

Another survey, reported by Secretary David Houston of USDA in 1913, showed that women wanted labor-saving appliances, assistance in home management, and a women's bureau. They complained of isolation

and loneliness. Some of their grievances were answered by the Smith-Lever Act of 1914, which for the first time made extension work an official institution.

Farmwives to the rescue. The entrance of the U.S. into World War I drained manpower from the farm, and once again, women filled the void. They picked cotton, harvested crops, and picked and packed fruit. The Food Production Act of 1917 employed 600 women as emergency extension agents. The next year the number had risen to 1,724 home demonstration workers and 762 boys' and girls' club workers.

Young women from towns and cities joined the Farmettes—a joint venture of USDA and the U.S. Food Administration—who canned and dried food and worked in commercial processing plants.

During the war years, many young women came to Washington, D.C., to work in USDA or the U.S. Food Administration. Generally, they were in low-grade clerical positions. One exception was Mary Pennington, who came to USDA to head the Food Research Lab in 1908.

USDA representative. Later that year, despite protests within the Department over the selection of a woman, she was designated USDA's representative to the first International Congress of Refrigerating Industries in Paris. In 1919, she left the Department to enter private industry, at twice her Government salary.

Dr. Pennington's work in sanitation and refrigeration led to revolutionary changes in the egg and poultry industries. A member of 12 professional organizations and 3 honorary societies, she was the first woman accepted in the American Society of Refrigerating Engineers. In 1940, she received the Francis Garvan gold medal, awarded to American women for distinguished service in chemistry.

A USDA first. Secretary Henry C. Wallace was instrumental in recruiting the first and only woman to head a major USDA research agency. In 1922 he announced his intention to expand the Department to include a new bureau of home economics to be

led by a woman. Louise Stanley, head of the Home Economics Division of the University of Missouri, was selected. At USDA, she directed important studies in nutrition, clothing, and housing.

Probably the most significant of these efforts was a landmark nutrition study conducted in the late 1920's and early 1930's to determine scientifically what makes up a well-balanced diet for humans at different levels of expenditure.

Supporting the war effort. Women reached another peak in their contributions to farm production during World War II, when they drove tractors or horse-drawn equipment; operated combines, reapers, mowing machines, and hay loaders; cared for cattle, and did the rest of the farm chores. Daughters who were away at college came home to work during vacations. The less fortunate were forced to drop out of school to stay home and help.

More than a million strong. During 1943-45 more than a million women were recruited for seasonal work, and over 32,000 for the year round, primarily on dairy and poultry farms. Women also worked in food processing plants—canning, freezing, and drying foods.

The major changes in American agriculture during World War II and the postwar years greatly affected the life of farmwomen. Most homes now have running water, central heating, electricity, telephone, radio, television, freezers, and other labor-saving appliances. Because of the trend toward large-scale, specialized farming, fewer farms keep a large garden, a cow for butter and milk, and a few chickens for eggs. Thus, these chores have been largely eliminated from the farmwoman's daily routine.

Nonetheless, farmwomen still do their share. Besides housework, they can and freeze foods, sometimes run tractors during planting and harvest time, and often do the paperwork that keeps the farm running.

A Day in the Life of a Farm Wife



January 14, 1931... It was so cold when I awoke this morning that ice had formed on the inside of the windows. Pulled the quilts up over my head and tried to pretend it was summer, but it didn't work. After counting to 100 I leaped from the bed and quickly dressed. Heard the baby stirring in the next room.

Downstairs in the kitchen I built a fire in the wood stove and fixed pancakes and sausage. The old stove was smoking worse than usual. It just doesn't draw any more. Made a mental note to talk to Frank this evening about getting a new one. A necessity!

After breakfast I milked the cows, strained the milk, and put it in pans. Skimmed the cream from last night's milking—crock's nearly full. Must churn tomorrow.

The morning's chores passed quickly. Washed the dishes. Made the beds, plumping up the feathers. Emptied the chamber pots. Did the laundry and hung it out to dry. The new puppy succeeded in dragging Frank's good trousers from the line. When I finally reached them, complete with a tear in the right leg, I had to do them all over again.

Before I knew it, it was time to start dinner. Freshened some pork, peeled potatoes, and fixed cabbage. Warmed up last night's apple pie and made a big pot of coffee. Rang the bell for the men to come and eat.

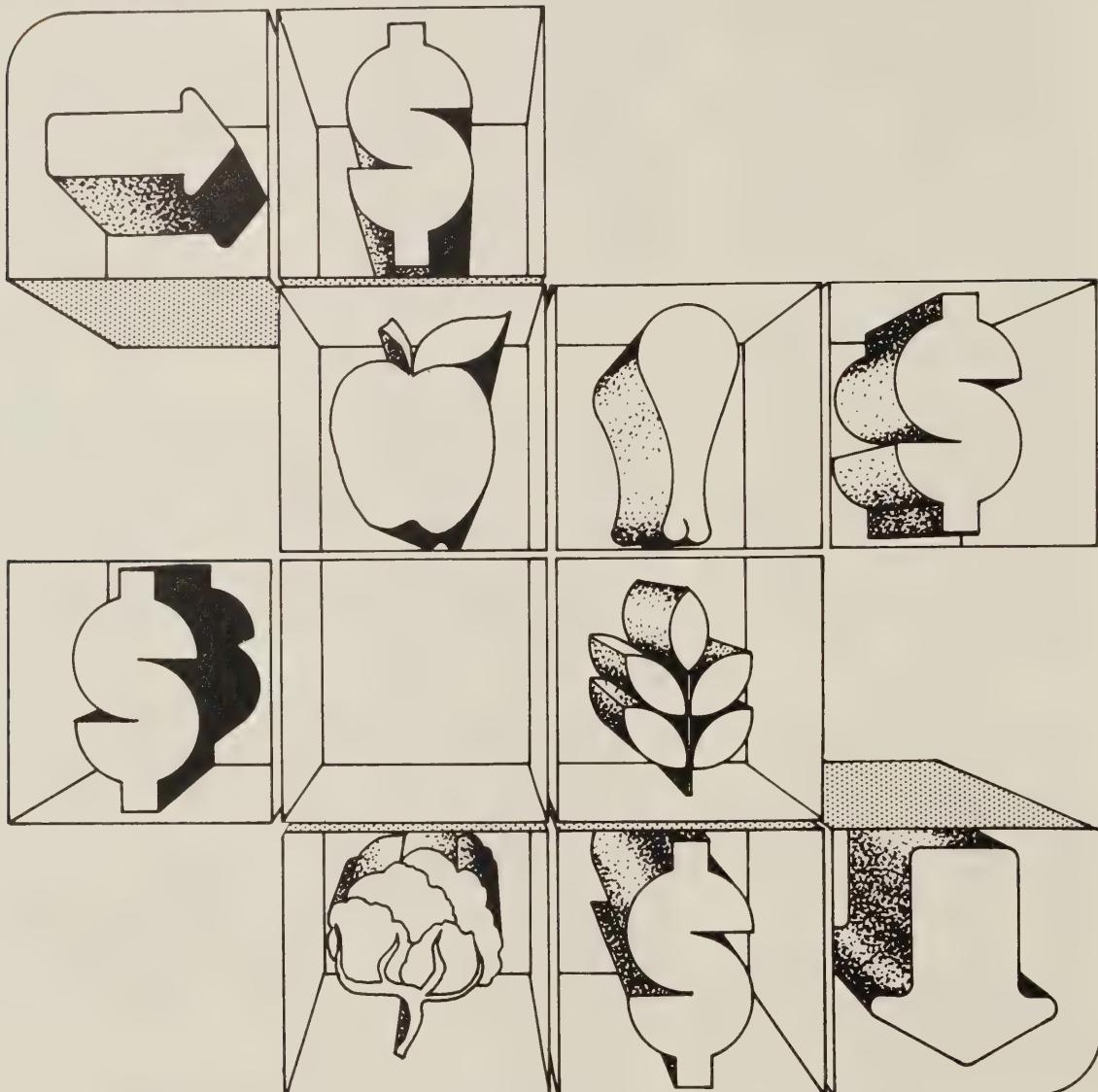
After dinner I washed the dishes. Seems like I spend half my life in the kitchen. Had to prime the cistern pump before I could get water. Filled the lamps and washed the chimneys. Got the clothes from the line—everything was stiff from the cold.

Had the children fill the wood box when they got home from school. Hardly had a chance to pay attention to the baby all day.

After feeding the chickens and gathering eggs, it was time to start supper—cold ham, warmed up potatoes from dinner, applesauce, and cookies. Supper was a little late; the men were out cutting wood.

Washed dishes for the last time today and prepared dough for baking tomorrow. Helped the children with their studies before they went to bed. I must talk to Frank about that new stove, but maybe I'll let that wait til tomorrow.

From Farm...



To Consumer

by Alden C. Manchester

If you had to name some of the unwavering trends in American agriculture, hikes in the marketing bill would be high on the list.

The bill doubled since the early sixties, nearing the \$100-billion mark in 1974. In fact, it's risen in just about every year from the time records have been kept—a constant reminder that the assembly, trans-

port, processing, and distribution of farm output is becoming increasingly complex and important.

For example, in food processing and distribution alone, some 600,000 establishments employ about 5 million workers.

In total, the farm-marketing system provides jobs for almost 1 in 4 of the Nation's workers.

And the marketing system now adds about \$1.50 to every dollar's worth of food commodities sold by farmers.

In tandem. Farming and marketing have evolved together, each influenced by the other. The development of technology, merchandising, and product differentiation has strongly tipped the trend toward specialization in farming. At the same time, the rise in agricultural productivity and the increase in size of farms have produced changes in the way the marketing system works.

Both farmer and marketer are beholden to the consumer whose demands, as expressed by his food purchases, ultimately determine what food products will be produced, in what quantity, and how much will be paid for them.

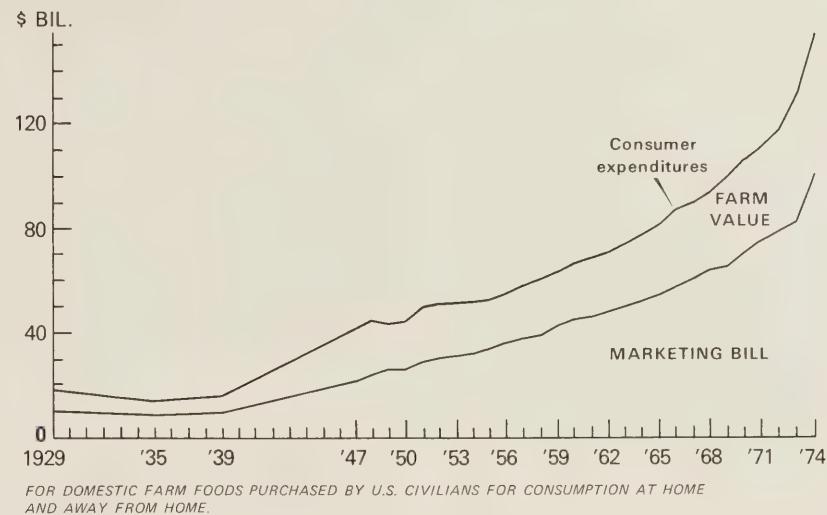
The consumer, on the other hand, depends completely on the farmer and the marketer, particularly if he lives in a city as most do. This dependence is a fairly recent development.

Self-providers. During the first century of our Nation's life, most people produced most of their own food. The marketing system was mainly the country store, which sold salt, sugar, spices, and a few other staple products. Even in the larger towns and cities, many families kept a cow, a flock of hens, perhaps a pig or two, and cultivated a garden.

As the Nation grew and farming spread westward, a marketing system developed for staple products. Dealers plied the back country buying staples such as grain or flour and hauled them to the city by horse or ox-drawn wagon. Cattle were driven to the cities, sometimes as much as 200 miles. But few dealers handled perishables, production of which remained near cities.

Selling to townsmen. The towns had market days almost from the beginning. Market places were designated and rules for conduct of business enacted. Early in the colonial period, farmers were allotted stalls in market buildings where they could sell

FOOD SPENDING: \$2 Out of \$3 Go for Marketing



Boats, like this paddlewheeler, often brought the early-day farmer supplies.

their produce. Some of these soon were occupied by merchants who bought from farmers and sold to the townsmen. Several of these markets are still in business.

Peddlers also were important in the marketing system of that day. Some were farmers, but many were merchants who bought from farmers and sold door-to-door in the city. Most of the peddlers handled only one line of products.

Gradually, the peddlers gave way to specialized stores—meat markets, vegetable stores, fish markets, poultry and egg stores, and others.

Some of the major milestones in the evolution of today's food system are in the field of transportation.

Not by chance. It was no happenstance that the original 13 States were strung along the Atlantic Coast, for the easiest means of transportation was by water. Wherever possible, food and other goods moved by sailing ship on the seacoasts and up the rivers. Away from the rivers, wagons took over where roads were passable. Livestock walked to market.

The 1820's and thirties saw the building of a canal system that eventually criss-crossed most of the level parts of the 13 States and extended into the Midwest. A main artery, the Erie Canal, opened up New York and States farther west to grain production. Grain farming in the prairies had to wait for the railroads, which came in the 1850's and soon replaced most of the canals.

After the Civil War, the advent of refrigerated rail cars using ice—and later the mechanical refrigerator car—made it possible to ship perishable foods over long distances. This in turn stimulated specialized dairy-ing, meat production, and fruit and vegetable growing in areas far from population centers.

Trolley transport. Until the internal combustion engine came along in the late 1800's, the assembly of farm products from the farm to the elevator along the railroad track or other concentration point was still a very slow process. From the 1870's

FROM FARM TO MARKET

1974 ESTIMATES

\$280 BIL.

FOOD
CLOTHING
TOBACCO

\$258 BIL.
CONSUMED
IN U.S.

\$93.5 BIL.

\$73.4 BIL.

GOODS AND
SERVICES
USED IN FARM
PRODUCTION

PRODUCTS
SOLD BY
FARMERS

\$22 BIL. EXPORTED



Farmers line up to deposit their wheat in a steam-operated grain elevator.



Agricultural exports today are big business for the U.S., bringing in around \$22 billion in 1974.



Piggyback truck and rail transportation, popular since World War II, streamlines delivery services.



By horse or buggy, 1920's strawberry farmers got their goods to market.

and as late as World War I, the "inter-urban" or trolley car hauled an amazing amount of perishable foods. The East and Midwest were laced with trolley tracks, and one could travel from the Atlantic Coast to the Rocky Mountains strictly on the inter-urban. But as the motor truck took over in the 1920's, the trolley retreated to the cities.

For perishable commodities, the country store was the buying station through much of the country's early history. Eggs, butter, fruit, and vegetables were purchased or bartered with the storekeeper for other items

the farmer needed. The storekeeper shipped the goods to town or city, usually to a wholesaler.

The pace of change in marketing quickened after the turn of the century, and especially in the post-World War II period.

Chains to the fore. Though chain-stores were organized in the last half of the 19th century, they did not become a major force in grocery distribution until the first 3 decades of the 20th century. By 1929, chains with four or more stores were doing slightly more than one-fourth of the food store business, though country

general stores still did a sizable volume.

The typical chainstore of the twenties was small, and it stocked a limited number of fast-moving grocery items that included few if any perishables. It served a fairly limited area on a cash-and-carry basis. The chains of that period built their success on a low-price policy made possible by the elimination of services such as credit and delivery, and the economies of mass procurement and warehousing.

The "cheapies." The depression created a fertile field for the food retailer who could feature low prices. The early supermarkets took advantage of this situation, cutting costs and prices even further through economies of mass distribution. Some of these "cheapie" supermarkets even eliminated display racks, piling cases of groceries on the floor. Sometimes these stores were in warehouses or abandoned automobile showrooms.

With the better times of the late thirties, the supermarkets became attractive places to shop. Some of the chains which had been reluctant to convert to supermarkets became convinced that the road to prosperity led—and competition compelled—in this direction.

In 1939, chains with four or more stores operated 82 percent of the supermarkets (stores with annual sales of at least \$300,000), compared with 52 percent in 1935.

Super sales. After wartime delays, conversion to supermarkets shifted into high gear. Their share of total food sales climbed to 63 percent in 1960 and then leveled off. Meanwhile, the shares for other stores continued to fall. Specialty food stores dropped from 17 percent in 1935 to 9 percent in 1974. The share for country general stores and others fell from 9 to 1 percent.

Along with the growth of mass merchandising through supermarkets, technological developments in processing, distribution, and merchandising made possible thousands of new products and new forms of old products.

Development of new products also was stimulated by the potential competitive advantage they offer. Once a new product has been successfully introduced under a brand name, the seller has created demand—a share of the market—for that product.

Demand creation has been one of the most potent forces operating in food marketing in the last half century or so. The typical supermarket handles 5 to 10 times as many items as the grocery store of 40 years ago.

Away-from-home market. Growing even more rapidly than the retail grocery stores is the away-from-home food market—restaurants and cafeterias, school lunchrooms, airline meal service, institutional mess halls.

"Fast food" establishments have registered the most dramatic increases. These include not only the familiar hamburger and hotdog stands but pizza parlors, fried chicken establishments, and an almost endless variety of others. A significant part of their business is for consumption off the premises.

All types of away-from-home eating establishments strongly emphasize reducing labor, particularly the fast food operations.

Fabricators. And the push to get labor out of the kitchen has created

MARKETING



FOR FARM FOODS, 1975

Percent*

Rent	3
Depreciation	3
Advertising	3
Business Taxes	4
Interest, Repairs, etc.	4
Corporate Profits (before taxes)	6
Transportation (intercity rail & truck)	8
Other (utilities, fuel, promotion, local for-hire transportation, insurance, etc.)	6
Packaging	12
Labor	51
Grand Total \$102 Billion	

* Preliminary.

tomers are being served, such as those on airplanes or in school lunchrooms.

Being different. Like retailers, food processors and manufacturers of dry grocery items have exerted tremendous efforts to make their products different enough to insure a share of the market.

Success often brings new problems, however. A new product that catches on will lead to imitations or slight variations by other processors, or to private label versions of it under chainstore brands. A manufacturer must maintain a continuous program of new product development so that he is never without new strings to his bow.

Marketers of perishable products have taken a somewhat different tack. Many have sought to broaden their lines. Fluid milk processors, for instance, have added new dairy products and fruit drinks. Some have developed their own outlets through dairy stores or convenience food markets in order to retain a place in the market.

Ice cream goes independent. Ice cream manufacturers have seen their outlets change from drug and confectionery stores to supermarkets in the past 20 years, with sharply increased emphasis on price competition at the retail level. They have responded by developing their own outlets—soft-serve ice cream stands and ice cream stores (many franchise operations) with emphasis on quality at relatively high prices.

In the broiler business, competitive pressures have led to a search for profits through integration into allied businesses such as feed mixing and distribution. Turkey processors have attempted to develop a line of "quality" turkeys as a differentiated product at substantially higher prices. The movement into further-processed poultry items is in part a search for differentiated products.

Branded Meats. Meatpackers also have engaged in a search for differentiated products that can be branded. So far these have been mostly processed products. The current emphasis on centralized meat

The Changing Face of Marketing



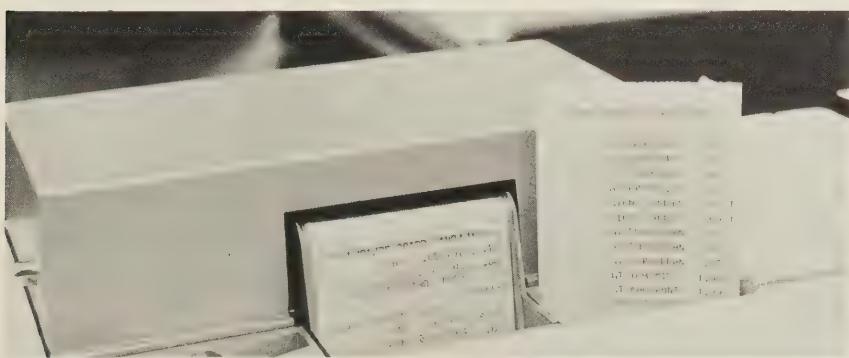
Early shoppers found a variety of produce at the many open-air markets.



Not so long ago, specialty shops were the only way to buy groceries.



Forerunners to today's supermarkets were cooperative curb markets.



Eggs were popular bartering items and were accepted by most grocers.



Fresh or not, seafood was a favorite item in pushcart marketing.



What next? New computer assisted checkout system is faster and more accurate. The description and price of items are printed on the receipt.

cutting is partly an effort of meat-packers to gain control of the marketing process at the point where fresh meat is packaged for retail sale, making it possible to differentiate the product.

Processors in every line of business are becoming fewer in number and larger in size. The economies made possible by increased size have made it almost impossible for small firms to compete.

Processors also are more diversified than formerly. Companies which were well known as dairy or apple firms 15 or 20 years ago are now in so many lines of business it is hard to characterize them.

Spreading the risk. This movement is in response to the desire to minimize risk by spreading operations over a number of different products, the desire to cut costs by spreading merchandising efforts over a wide line of goods, and the need of many large firms to put their expansion efforts into other lines to avoid anti-trust prosecution.

Not the least among the forces affecting marketing are the changes occurring on the farm. Increasing commercialization and greater size of farms has changed many purchasing practices. The assembly of milk and eggs, for example, has changed because individual farms now supply several times as much product as formerly. Costs of assembly are much lower than they otherwise would be and quality control problems are different. Many producers are now large enough to pack and deliver their own eggs directly to supermarket groups at low cost.

Some cattle feedlots have grown so huge that they slaughter their own cattle. They sell directly to meat-packers without the use of terminal markets or auction facilities. There is growing use of on-the-rail selling where the feeder is paid on the basis of the yield of dressed meat in the packing plant rather than on the buyer's estimate of the possible yield from a given lot of cattle.



When shopping was fun

One seldom looks forward to grocery shopping today. Jampacked parking lots, long lines at the cash register, picked over produce—who needs it? It's hard to believe that doing the weekly shopping was once looked upon with pleasure.

Back in the days when the country store was in vogue, whole families would pile into their wagons for the weekly shopping spree into town. They usually went on Saturdays, but would often arrange their trip to coincide with some other activity, such as a school play or a church social.

The country store offered a bit of everything. Such items as salt, coffee, tea, spices, ammunition, tools, and hardware were purchased by even the most self-sufficient farmer. Canned fruits, salted fish, and an assortment of candies were welcome additions to monotonous diets and those with sweet tooth. Clothing, especially overalls and work shirts, as well as boots and shoes, were fast-selling items, even though finding a size that fit was often a chore.

Most storekeepers gave credit and often accepted produce in lieu

of payment. Eggs and butter were especially popular bartering items, because the storekeeper could sell them to a merchant for a tidy profit—providing they hadn't turned rancid from lack of refrigeration.

In 1872 the first comprehensive mail-order house opened for business, much to the chagrin of local storekeepers. This new service, which offered and glamorized just about every kind of merchandise the farmer and his family might possibly want, posed a direct threat to the country store.

In many small towns, the post office was located in the general store. Although storekeepers welcomed the extra money they received moonlighting as postmasters, they hated having the mail-order business operating right under their own noses!

With the birth of the automobile and good highways, most country stores have disappeared, and few of today's youngsters will witness this colorful feature of our American heritage.

[Based on special material by Wayne D. Rasmussen, National Economic Analysis Division.]



Stewpot to Supermarket

by Alden C. Manchester and Corrine Le Bovit

Every day is feast day for American food shoppers. They can find 5,000 different products on display in the average supermarket. And much of the work of preparing this food, including the cooking, is often done before it reaches the checkout counter.

This is quite a contrast to the scene of two centuries ago when typical American families ate out of stewpots. They supplied most of what went into the pots by their own efforts — by farming, fishing and hunting, and foraging in the wild.

The hard fact that our ancestral diet was usually drab and sometimes skimpy runs counter to cherished romantic notions about the bounty of our past. When we think of early American meals, visions of the sumptuous, beautifully appointed tables of Williamsburg or Mount Vernon often come to mind.

The vision is valid for the few Wealthy plantation families in the South enjoyed an opulent diet. They had skilled slave cooks who prepared a wide variety of foods, both domestic and foreign, in well-equipped

kitchens in buildings separate from the family house.

The small middle class of merchants, craftsmen, and clergy in the principal seaboard cities of New York, Philadelphia, Boston, Baltimore, and Charleston also ate well. Many also kept slaves or servants to do kitchen work.

City gardeners. But the southern planters and the urban middle class made up only a small fraction of the population. Even in cities, those in the lower economic classes provided most of their foods from gardens



School lunch programs help today's kids obtain a varied, balanced diet.

and their own domestic animals. What food they purchased came from peddlers or from farm markets. Food stores were unknown.

In rural areas, where nine-tenths of the population lived, people depended on their own resources for their food. Their diet varied with the seasons, with their success in raising crops and livestock, and with the availability of food in the wild. At best, the quantity was abundant, but at any given meal or season, variety was almost totally lacking.

Cooking was done entirely at an open hearth. The first American cookstove was cast in 1765, but only the very rich could buy one. Most families could afford only one large iron cooking pot.

Cooking was drudgery. Most housewives had many chores besides cooking: The fire had to be built and tended, bread baked, cows milked, butter churned, vegetables picked and cleaned, animals dressed and cut up, and so on. There was no time for preparing fancy or complicated dishes. Nearly everything for a meal went into the one large kettle and was cooked together.

Much of the equipment that we are accustomed to was lacking. In many homes there were few chairs; children stood at meals. There were usually just enough wooden bowls and spoons for the family, and guests

were expected to bring their own. A fairly prosperous family might have a few pieces of pewter ware.

Breakfast was commonly a bowl of porridge or cornmeal mush with cider or beer. Only the more well-to-do could afford tea or coffee.

From crack of dawn. The midday dinner was a stew that started cooking at dawn. People helped themselves from the stewpot. Supper was generally the remainder of the stew, or a gruel made from the leftovers. Some families ate only two meals—breakfast and a midafternoon dinner.

Bread was baked once a week if there was an oven. While the dough was being prepared, a fire was built in the oven and kept burning until the brick walls were thoroughly

heated. Then the ashes were raked out, the loaves put in, and the door sealed. If there was no oven, some breadstuffs could be baked in pots or skillets on the hearth.

Tough and stringy. Most meat was tough. Hogs generally foraged, and the quality of the pork did not compare in tenderness or taste with the modern grain-fed product of the Corn Belt. Beef was stringy and had to be pounded, mashed, or chopped to be edible. Even if the limited cooking facilities had not required it, stewing was the only method for making it edible. Venison and other game were available in many areas as well as fowl, both domestic and wild. Fish and seafood were widely used along the coasts and bays.

Seasoning was done primarily with herbs, mostly wild. The most common sweetener was molasses, but in New England maple syrup and sugar were popular. Some cane sugar was imported in large cone-shaped blocks from which chunks were broken off and pounded into a powder.

Food pooling. Feasts on holidays and other special occasions provided the main relief to the monotony of the diet. At harvest time, sugaring-off time, Thanksgiving, or for funerals and weddings, people pooled their food and labor to provide greater variety.

In contrast to colonial times, not only do today's consumers have a much larger variety of foods to select from, but a much higher pro-



Consumer aid: nutrition research provides information for food shoppers.

Bounty of the Past

Inn Patrons Ate Reasonably Well

Dear Thomas,

I have been treated with the utmost courtesy during my journey at the home of Master Hale in Salem yesterday upon rising in the chill early morn we gathered before the welcome warmth of the hearth where Mistress Hale spooned into our bowls generous portions of corn mush sweetened with molasses. Young Master Hale filled our mugs with delicious spruce beer. There was much admiration of my pewter mug the likes of which had not been seen heretofore.

I watched with interest as Mistress Hale put into the kettle the corned beef, cabbage, turnips, and parsnips that would boil together for the family's dinner later in the day. Midafternoon I was informed that dinner was ready and brought my bowl. The boiled dinner was washed down with drafts of cider, deliciously hard. When I had my fill of meat and vegetables I turned over my bowl and filled the other side with a sauce of pompon (pumpkin) sweetened with maple syrup.

The bounty at this place is truly wondrous.
Your respectful friend,
Josiah

portion can afford to eat well. When the country was born, only a handful of families were even moderately well-to-do. By 1973 only 11 percent fell below poverty guidelines, though this probably has increased some because of the recession.

Progress has been especially rapid in the last couple of decades. As recently as 1959, 22 percent of all Americans were in the poverty class.

Uncle Sam as provider. Even for that part of the population still in poverty, the way has been eased by public assistance programs instituted in the 1960's. The USDA food pro-

grams alone are assisting nearly 20 million persons to obtain a more adequate diet through food stamps, and 10 million receive school lunches, either free or at a reduced price. While food stamps do not make it possible for low-income people to eat luxury food, they can eat much better than the poor in the "good old days."

The changes over the two centuries add up to a decided increase in consumer demands on the American farmer. A vastly larger population—210 million plus vs. 3½ million—has much more money to

Southern Rich Had Everyday Feasts

Margaret Horne Wilkes
Twin Oaks plantation
Savannah, Georgia

Hattie, Colonel Wilkes and I will be entertaining six guests on Friday evening. I would like the following menu to be served at 8 o'clock on the south terrace.

We will begin with roast saddle of mutton, stoned chicken with egg sauce, ham, buttered shrimp, boiled fish garnished with horse radish and lemon, meat pie, hot biscuits, turnip tops boiled with bacon, fried eggplant, cauliflower with butter sauce, and green salad of lettuce, pepper grass, and cress seasoned with tarragon vinegar & olive oil. For refreshments we will have fresh wines, English beer, and West Indian rum.

For the second course, I would like you to prepare one of your lovely pyramids of fruit tarts. Also apple custard, pear compote, sponge cake, flummery, and peaches preserved in brandy. Madeira, port, tea, and coffee will be served with the sweets.

We will finish with an assortment of figs, raisins, and almonds.

Mrs. H. Wilkes

spend, is eating a wider variety of food, and is producing less for themselves.

Cutting calories. At the same time, there has been a shift in the kinds of diets people need to keep them in good health. As machines replaced human muscle in factories and on farms, the number of calories needed by Americans has dropped sharply.

Partly because of this, there has been a decided swing away from foods like potatoes and grains to meat and other more concentrated foods. Consequently, the average American's diet requires more farm

resources than the diets of earlier times.

Although consumers are generally satisfied with the food they buy and the institutions that produce, process, and distribute it, they share some concerns that seldom bothered their colonial ancestors.

Food prices. First and foremost is food prices. From the end of the Korean War until 1972, substantial supplies kept farm prices at a fairly low level. Retail food prices increased a bit more slowly than prices of other goods and services and much more slowly than income. This permitted many Americans to increase spending for automobiles, television sets, recreation, and education. So it is small wonder that the sharp food price rises of 1973 and 1974 sent shock waves throughout the country.

Point of no return. Though the food price increase has slowed, it is clear that the price levels of the 1950's and 1960's are not going to come back. Agriculture uses substantial amounts of energy, both directly to run farm equipment and indirectly in the manufacture of such inputs as fertilizer which have helped raise the productivity of American farming to such impressive levels. Energy

prices will continue to increase and with them the costs of farming. This will have to be reflected in farm product price if the output we need to feed an increasing population is to be forthcoming.

Because of the recession, income is rising more slowly and consumers are spending a slightly higher proportion for food than in the last few years. When the economy picks up, income is again likely to rise faster than food prices and expenditures. Many on low, fixed incomes will continue to be pinched by food costs, although food stamps will help.

Additives. Another major concern is the quality and safety of the food supply. The problem centers on additives and other components of foods. It is similar to the concern of 70 years ago about the unsanitary conditions in slaughter houses and processing plants which led to passage of the Pure Food and Drug Act of 1906. However, the relation between specific components of the food supply and health are largely unknown or speculative.

Another concern is with the costs associated with increasing the variety of foods available. Many believe that eventually a trade-off

between variety and costs must be faced.

Concern over nutrients. Another common worry is about the nutritional content of the food supply. The virtues of particular diets for health or other reasons are being vigorously argued. Proposals are being pushed to drastically change the nutritional content of the American diet by measures designed to reduce consumption of sugar, animal fats, and additives.

Dissatisfaction also is expressed with the information consumers have available on which to base decisions about buying and preparing food. As a result, open-dating of perishable food is now quite general and unit pricing common in supermarkets. Nutritional labeling of food products is already underway and will be required in the near future under regulations of the Food and Drug Administration for any food for which nutritional claims are made.

Advertising of food products has been considerably modified by regulatory action of the Federal Trade Commission. Several proposals for further regulation are being reviewed.

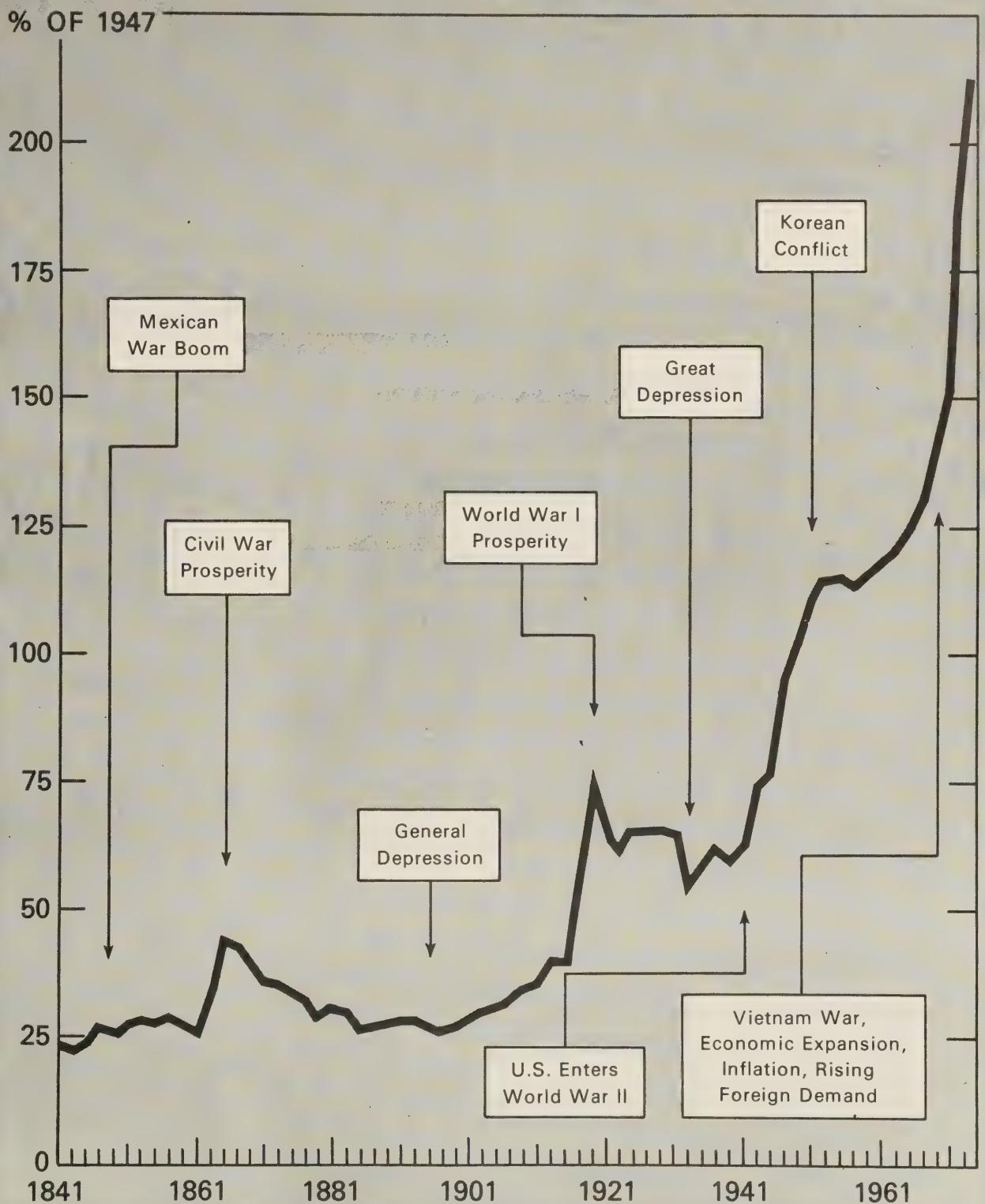
Capacity to produce. Another concern sometimes expressed by consumers—but one for which there is little basis—is worry over the supply of food. American farms have the potential capacity to vastly increase output of major agricultural products. Given favorable product prices, no restrictions on land use, more general use of technology, and adequate supplies of inputs, farmers by 1985 could produce 50 percent more feed grains than in 1972, 44 percent more beef cows, 30 percent more cotton, 4 times as many peanuts, and twice as much rice. The increases actually achieved will depend on the incentives farmers have.

But in any case, the U.S. in the foreseeable future will remain—as it has been for 200 years—a land of plentiful food.

SHARE OF AFTER-TAX INCOME SPENT FOR FOOD



TRACKING FOOD PRICES



The Truth About Grandma's Cooking

1.



2.



3.



6.



4.





7.



3.



5.



Tif you didn't notice the monotony of the oldtime menu, Grandma may have been an even better cook than you thought (photo 5).

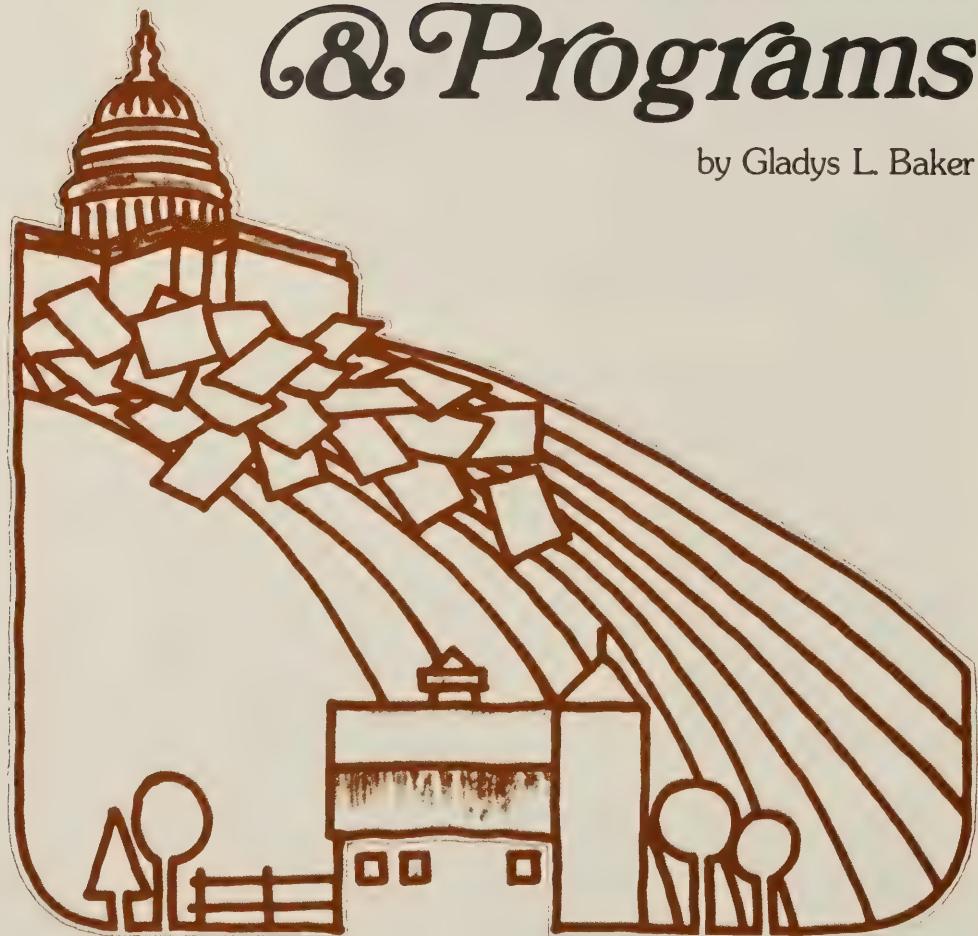
The rich ate well in bygone days, supplementing the best of domestic fare with the cream of imported wines and delicacies. But for the vast majority of people, the rural and urban poor, meals were lacking in variety and often tasteless, and eating was something you did because you had to, not because you enjoyed it.

Our rural ancestors had to rely on their own cunning to feed their families. They supplied most of their food by gardening and raising domestic animals (1, 6), fishing and hunting, and foraging in the wild.

Even if there had been enough variety of food to allow it, housewives wouldn't have had the time to prepare fancy or complicated dishes. Besides cooking (2), they had to build and tend the fire, bake bread, milk the cows, pick and prepare vegetables (3, 5, 7), churn the butter, as well as an endless number of other chores. Sometimes they pooled their efforts in a community kitchen (4)—an equal amount of work, but a lot more fun.

Farm Problems & Programs

by Gladys L. Baker



From the beginning, Government policies and programs have played a key role in agriculture, but the nature of that role has changed with the times.

The immigrants to the English colonies of the new world came to escape oppression and to get land of their own. They soon found they needed Government to help them secure and protect their farmland from speculators.

The first concern of farmers after the break with Britain was with laws on the settlement and distribu-

tion of Federal lands to the west.

Soon farmers called on the Government to provide needed services such as roads, rural free delivery of mail, and parcel post. There also was a great deal of agitation for assistance in research and education that resulted in the creation of the U.S. Department of Agriculture, the land-grant colleges, extension services, and the experiment stations (See R & D for Farms, May 1975 Farm Index).

Commercialization. After the Civil War, the growing commercialization

of agriculture brought price and cost problems to the forefront. These reached disastrous proportions during the depressed 1930's, resulting in a series of agricultural adjustment programs which sought a cure through reduced production.

Today, the emphasis has again shifted. Reflecting the rapid growth in world demand for farm products, the programs of the 1970's put primary emphasis on maintaining or increasing production.

Price-cost problems became critical in the depression following the Civil

War. Agricultural unrest was widespread. Farmers joined together in the Grange movement to secure legislation regulating railroads and monopolies. Later, in the 1890's, the Populists called for inflation of the currency and loans on farm products.

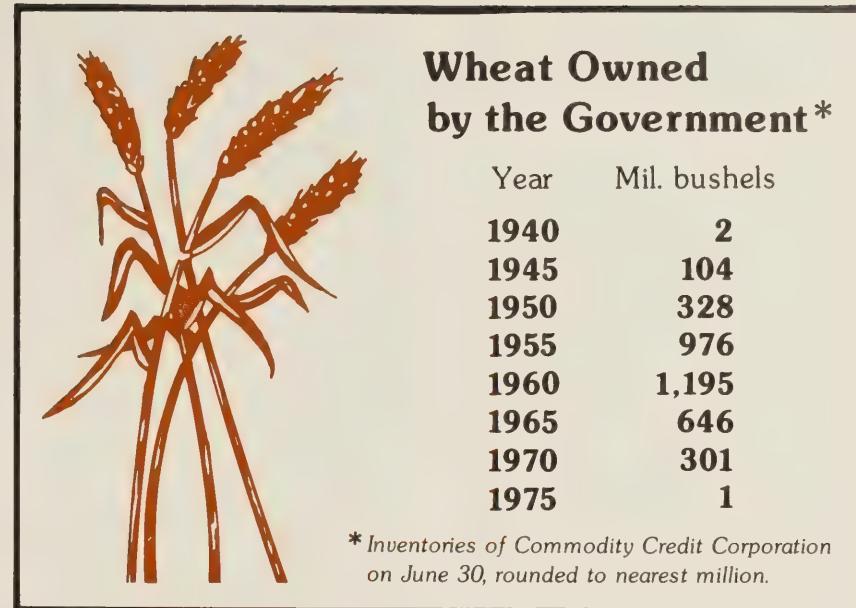
Golden era. Economic recovery brought what is often nostalgically looked back on as the "golden era" of agriculture—the period from the late 1890's to World War I. Rapid industrialization and urbanization coming at a time when the expansion in agricultural production was leveling off pushed prices received by farmers up faster than their costs. Favorable prices and the lack of virgin land for development led to sharply increased land values.

Agriculture's period of peacetime prosperity was followed by an unprecedented period of wartime inflation. The Government exhorted farmers to produce more food to win the war. With the added incentive of high prices, they responded by plowing up some 40-million acres of land not cultivated before, and by buying more land and tractor-powered machinery for large-scale production.

Heavy mortgages. Farmland was heavily mortgaged to provide funds for the purchase of additional land and labor-saving machinery. But with farm product prices and land values soaring, increased mortgage debt caused little concern.

The index of farm prices rose from 100 in 1914 to 221 in 1919. Gross farm income rose from a general level of about \$7.5 billion in 1910-14 to \$17.7 billion in 1919. The value of all farmland and buildings rose from \$35 billion in 1910 to \$66 billion in 1920.

When the war boom broke in the fall of 1920, agricultural prices fell precipitously. But production costs, which also rose during the war, stayed high. Heavy fixed charges on farm debts and increasing taxes and freight rates became an intolerable burden. Caught in a disastrous cost-price squeeze while the rest of the Nation continued to prosper, wheat growers blamed speculators and the



importation of low-cost Canadian wheat.

Thwart speculators. The American Farm Bureau Federation and the National Grange maintained that price losses were due to "bear propaganda" or to "gambling in farm products." Acting on the belief that speculative manipulation was the cause of price declines, farmers organized crop withholding movements to thwart the speculators.

When wheat withholding actions proved unsuccessful, farmers organized cooperative marketing associations. These also failed, chiefly because they were based on too simple a diagnosis of the problem, and on a naive assumption that a farming industry made up of scattered, individualistic units could be operated like the large corporations of heavy industry.

The agricultural depression reflected fundamental changes in international relations and in the American economy. During World War I the U.S. had changed from a debtor to a creditor nation.

Debts and tariffs. Instead of sending our agricultural surpluses abroad to pay our debts to Europe, we were in the position of receiving surpluses from Europe in repayment for war

debts. But higher tariffs were keeping out European goods at the same time we were demanding repayment of debts. The combination of debts and tariffs made it difficult for Europe to buy from us. European purchases were made possible only by a series of private loans.

The problem was compounded by the effort of European nations toward self-sufficiency in food. Tariff and quota barriers were raised to protect home food production, and in some cases, in retaliation against postwar increases in American tariffs. American farm products also had to compete with products from virgin low-cost land opened up during World War I in Canada, Australia, and Argentina.

Exports decline. As a result of these factors, agricultural exports declined from \$4.1 billion in 1919 to \$1.9 billion in 1922.

Shrinking export markets were accompanied by declining domestic demand due to the sharp drop in immigration resulting from postwar immigration laws. Changes in American eating habits also cut the market for wheat producers. Per capita consumption dropped from 5.6 bushels when World War I started to 4.6 bushels during the 1920's.

The farmers' market was curtailed at a time when production reached new heights due to wartime expansion in cultivated acres and to technological improvements.

Replacement of horsepower by machine power alone released some 35 million acres of land for the production of crops for market.

Higher farm tariffs were the first legislative remedy to redress the lack of balance between agriculture and industry. When these failed, new solutions were sought.

The Bloc is built. Heading the drive for new legislation was the Farm Bloc organized in Congress on May 9, 1921. The Bloc first concentrated on regulatory legislation affecting grain exchanges and packers and stockyards.

It also was instrumental in passing the Capper-Volstead Act which exempted farmers' cooperatives from the provisions of the Sherman Anti-Trust Law, authorized the War Finance Corporation to provide some assistance to agriculture, and established a Division of Cooperative Marketing in the Department of Agriculture in 1926.

USDA supported legislation sponsored by the Farm Bloc. The Department also began to concentrate on providing economic information and forecasts of prices and markets to farmers in the hope that adjustments by individual farmers in production and marketing would result in higher prices. National annual outlook conferences began in 1923.

Farm depression. Farmers' price and income problems persisted, despite these efforts. The continuing farm depression in the midst of industrial prosperity caught farmers in a serious cost-price squeeze and brought strong pressure for Government intervention.

Many plans were proposed. But one developed by two farm machinery executives, who found that "you can't sell a plow to a busted customer," caught fire in the country. This was the McNary-Haugen plan. It was based on the concept that with Government help, farmers could sell their

surplus abroad with the result that domestic prices would increase to a pre-war ratio between prices farmers received and the prices they had to pay.

The two-price plan was before Congress for 6 years. Secretary of Agriculture Henry C. Wallace favored the plan, calling it an attempt to secure "even handed justice for the farmer."

Coolidge vetoes. But his successor, Secretary William M. Jardine, and President Calvin Coolidge were adamantly opposed. Coolidge vetoed McNary-Haugen bills in 1927 and 1928.

The McNary-Haugen fight publicized and dramatized the farm problem. However, the plan was built on the delusion that an inexhaustible foreign market existed on which

farm commodities could be dumped without fear of retaliation. It did not take into account the tremendous technological advances being made during the 1920's which would bring about greatly increased output. The McNary-Haugen plan had no provision to prevent its price-raising features from causing an increase in production.

After the defeat of the McNary-Haugen bills, the Administration turned to strengthening farmer cooperatives as a solution to the farm problem.

Federal Farm Board. The Agricultural Marketing Act of 1929 established the Federal Farm Board. It had a revolving fund of \$500,000 and was directed to promote orderly marketing



Cotton farmers in 1941 hear an Agriculture Adjustment Administration representative explain cotton programs.



President Franklin D. Roosevelt issues first check in 1933 to a farmer for reducing cotton production.

by making loans to cooperative marketing associations. The Act also provided for establishing stabilization corporations to control any surpluses that might arise.

Stabilization corporations purchased wheat and cotton but the disastrous decline in farm prices continued. The Board's failure resulted in its programs and advice being discredited. It was forced into an inactive role during its last year. By then the Great Depression of the 1930's was in full swing.

In its final report, on December 7, 1932, the Board wrote that ways must be found "to secure a better adjustment between the quantities produced and the needs of the market." It recommended that legislation be enacted which would "provide for regulating acreage or quantities sold or both."

Production control. The Federal Farm Board provided a striking

demonstration that improved marketing mechanisms alone do not work when production is far in excess of effective domestic and foreign demand. The experience of the Farm Board was a step toward the development of production control.

Faced with immediate bankruptcy, some farmers felt they could not wait for new legislation being pushed by farm organizations in Congress. A National Farm Holiday Association pledged to withhold food from markets until prices reached costs of production. Violence erupted in some areas.

On January 25, 1933 the President of the American Farm Bureau Federation warned a Senate committee: "Unless something is done for the American farmer we will have revolution in the countryside within less than 12 months."

The AAA is passed. Congress responded by passing the Agricultural

Adjustment Act of May 12, 1933, which authorized production control as the primary tool for raising farm prices and income.

The Act gave the Secretary of Agriculture authority to reduce acreage or production by voluntary agreement, to enter into marketing agreements with processors to control prices paid producers, and to license processors and others for the purpose of eliminating unfair trade practices. Farmers could receive rental or benefit payments, and the Department could spend money to expand markets or remove surpluses. These activities were to be financed by a processing tax.

The acreage reduction programs with their goal of raising farm prices toward parity (the relationship between farm prices and costs which prevailed in 1910-14) could not raise prices fast enough for the producers of cotton and corn. They demanded price fixing.

CCC loans. The Government responded by creating the Commodity Credit Corporation (CCC) in October 1933 which made immediate nonrecourse loans for these commodities. The CCC has been used to carry out many Government programs since.

Pressure from cotton and tobacco producers resulted in the introduction of compulsory marketing programs for these commodities in 1934.

Surplus disposal programs were initiated in October 1933 as an emergency supplement to the crop control programs. These were first carried out by the Federal Surplus Relief Corporation. They were financed by Section 32 of the August 1935 amendments to the Agricultural Adjustment Act which set aside 30 percent of the customs receipts for the removal of surplus farm products.

Today's Food Stamp, School Lunch, School Milk and other distribution programs developed from the early surplus disposal programs.

Import quotas. The August 1935 amendments also added Section 22 to allow the President to impose import quotas when he found, after investigation by the Tariff Commission, that

imports materially interfered with price support and adjustment programs. This authority has been used a number of times for dairy products and meat and occasionally for other commodities.

The Agricultural Adjustment Program was brought to an abrupt halt on January 6, 1936 by a decision of the Supreme Court which invalidated the production control provisions of the Agricultural Adjustment Act of 1933.

Soil conservation. The Soil Conservation and Domestic Allotment Act of February 29, 1936 attempted to reduce production of surplus crops by paying farmers to shift acreage from soil-depleting to soil-conserving crops. The Act encouraged conservation but failed to achieve the objective of reducing crop output.

The Agricultural Adjustment Act of 1938 combined the conservation program of the 1936 Act with new features designed to meet drought emergencies as well as price and income problems resulting from sur-

plus production of farm products.

Marketing control was substituted for direct production control and authority was based on Congressional power to regulate interstate and foreign commerce. The new features included mandatory loans for some commodities, marketing quotas, referendums, crop insurance for wheat, parity payments, and the Ever-Normal Granary plan designed to protect consumers as well as farmers.

Crop insurance. A Government insurance program to protect wheat producers from the hazards of crop failure was launched on April 19, 1939. After a trial period, crop insurance was extended to other commodities.

The Government also moved to help farm people who were losing their homes through mortgage foreclosures during the Great Depression. The Federal land banks and Federal intermediate credit banks established under laws enacted in 1916 and 1923 were unable to meet the crisis. The Emergency Farm

Mortgage Act of May 12, 1933, the Farm Credit Act of June 16, 1933, and the Federal Farm Mortgage Act of January 31, 1934 provided for emergency credit and for establishment of local production credit associations.

An independent Farm Credit Administration was set up on May 27, 1933 to administer the Acts. It became a part of USDA on July 1, 1939, and then became independent again in 1953.

Crucial supply. When the U.S. entered World War II in 1941, credit was an important production resource. The large stocks of wheat, cotton, and corn in the Ever-Normal Granary became a military reserve of crucial importance. Even before the Japanese attack at Pearl Harbor, the U.S. was supplying food to Great Britain and the U.S.S.R.

The Secretary of Agriculture called for increased production of many commodities in 1941, and Congress in the Steagall Amendment provided price support guarantees for many crops. The objective was to meet wartime needs and to insure that farmers shared in the prosperity that defense contracts with their guaranteed profits were bringing to industry.

Price support. Price support levels for the war crops and for basic commodities were raised to 90 percent of parity and higher. The price support guarantees remained in effect until December 31, 1948.

A War Food Administration working within USDA was established in 1943. Except for certain types of tobacco, acreage allotments and marketing quotas were discontinued by August 1943. Emphasis shifted to increased production for war requirements and postwar relief of devastated and famine areas.

Food prices in the U.S. were controlled and a number of foods were rationed. Farm machinery also was rationed, and fertilizers and insecticides and materials used for manufacturing farm equipment were under priority controls. Farm labor was recruited, trained, and assigned to areas where needed. Workers were



A farmer proudly holds up his ballot in the first national market quota referendum in 1941.

brought in from Mexico and other countries. A Combined Food Board was established to allocate food supplies among nations cooperating in the war.

Agricultural Act of 1948. Before the wartime price support program expired, the Agricultural Act of 1948 was enacted. The Act, a compromise measure, provided 90 percent price support levels for a number of commodities through December 31, 1949, and a sliding scale of price supports thereafter.

However, the Agricultural Act of 1949 continued support prices for basic commodities at 90 percent of parity for 1950. They were to be between 80 and 90 percent for 1951 crops and between 75 and 90 percent of parity for the 1952 and succeeding crops. These laws began eliminating the requirements for price supports for most nonbasic commodities.

With the outbreak of the Korean War in 1950, price supports for basic commodities were maintained at around 90 percent of parity under the national defense provisions of the Act of 1949 and under amendments to the Defense Production Act of 1952. The 1952 amendments ex-

tended the period of 90 percent parity supports for basic crops through the 1954 crop year.

Surpluses pile up. After the Korean War period large surpluses began to pile up again in the Ever-Normal Granary. A sharp rise in yields due to technological improvements raised production even though acreage was limited under production control programs.

The Agricultural Act of 1954 provided for "set asides" of 400 to 500 million bushels of wheat and 3 to 4 million bales of cotton. The set asides were to be excluded in the computation of price support levels, but were to be included in the computation of acreage allotments and marketing quotas.

The issue of flexible versus high-level price support, which emerged again after the Korean War, resulted in a series of compromises between Congress and the Administration. The Act of 1954 provided for flexibility in a narrow range from 82.5 to 90 percent for 1955 and 75 to 90 percent thereafter for basic commodities, except tobacco which remained at 90 percent.

Using surpluses. To relieve the buildup of surpluses, to assist developing

countries, and to eventually build up new markets, Public Law 480 (PL 480) was passed on July 10, 1954. The law authorized the Government to make agreements for the sale of farm products for foreign currency, to make shipments for emergency relief, and to barter farm products for strategic materials required by our Government.

PL 480 proved to be of major importance in disposing of farm products abroad and in aiding the economies of developing countries. In fiscal years 1954 through 1958, exports under Public Law 480 accounted for 27 percent of total farm exports. During the 1950's exports of farm products to nations abroad reached higher levels than ever before in our history.

Soil banks. Despite the contribution of PL 480 programs in reducing crops in storage, the problem of surpluses still remained. In 1956 the Soil Bank Act was passed as a part of the Agricultural Act of 1956. It provided for a program of annual acreage diversion in its Acreage Reserve and a longer term, 3- to 10-year land retirement in a Conservation Reserve Program. The Acreage Reserve Program ended in 1958.

On July 15, 1960, nearly 29 million acres were under contract in the Conservation Reserve. Most of the contracts expired during the 1960's, but some did not expire until 1972.

Acreage allotments ended. The Agricultural Act of 1958 gave corn producers the opportunity to vote on a new program which discontinued acreage allotments and made price supports available to all producers at 90 percent of the average price during the 3 preceding calendar years—but in no event at less than 65 percent of parity. A majority of the growers voted in favor of this alternative and acreage allotments for corn were discontinued with the 1959 crop.

Under other provisions of the Act, cotton producers were given a choice of supports for their 1959 and 1960 crops based on two different acreage allotments. In 1961 growers were to return to a single no-choice program



Farmers crowd around a counter to apply for price support loans and Government aid in the 1930's.

with the range of support set at 70-90 percent of parity. For 1962 and subsequent years the range of support was to be set at 65 to 90 percent of parity.

New price supports. Under the Act of 1959 price supports for most feed grains became mandatory. Although acreages planted were limited, new agricultural technology increased production at a rate faster than it could be absorbed by the market—even with a growing population and increased sales under PL 480.

Legislation continued to make innovations during the 1960's. Among them: discontinuance of provisions for wheat marketing quotas, elimination of the 55 million-acre minimum national allotment for wheat, introduction of a certificate program for wheat (a program for direct payments to bring returns to farmers on the part of their crop consumed domestically up to parity), provision for acreage-poundage marketing quotas for tobacco, diversion of acreage in a cropland adjustment program, and lowering the loan rate to encourage exports while making up the difference by payments.

Looser controls. The Agricultural Act of 1970 discontinued crop-by-crop acreage allotments and marketing quotas for wheat, feed grains, and upland cotton. To receive price supports the farmer was required to keep a specific percentage of his cropland out of production. He could then grow whatever he wished on his remaining land except for crops that remained under control because of earlier legislation. These crops included sugar, rice, peanuts, tobacco, and extra-long staple cotton. Payment limitations were established for the first time. On April 14, 1971 an amendment provided for poundage quotas for burley tobacco in lieu of acreage allotments.

Worldwide demand. By 1973 the demand for American farm products was at a high level due to world crop shortages and worldwide inflation. World demand, combined with export subsidies and the devaluation of the dollar, had liquidated the stocks that had been built up under

previous price support programs.

The Agriculture and Consumer Protection Act of 1973 placed its emphasis on production to respond to "ever-growing, worldwide demand for food and fiber." Secretary Butz declared that the legislation represented "an historic turning point in the philosophy of farm programs in the United States." The fundamental difference was its emphasis on maintaining or increasing production in contrast with the earlier programs to curtail production of wheat, feed grains, and upland cotton.

Target price levels. A new concept was introduced under which supports were to be used only when market prices fell below target price levels. Payments were not to be made as they had been in earlier programs when market prices were high. An escalator clause allows for adjustments of target prices in 1976 and 1977 to reflect changes in farm production costs. Payments, if used, are

to be limited to \$20,000 per person.

The Act also authorized "disaster" payments if eligible producers were prevented from planting any portion of allotments because of drought, flood, or natural disaster, or events beyond their control. Payments were to be available when natural disaster prevented a farmer from harvesting two-thirds of his normal production of the allotment crop. Loan levels were to be set below expected market prices to put greater reliance on the marketplace.

Law extended. Although there were virtually no surpluses, PL 480 was extended for an additional 4 years.

If the current high foreign demand for agricultural commodities should not continue, or if another technological explosion occurs, the Secretary can use standby authority to support prices and to limit total acreage planted to major crops.



Workers at a North Dakota grain storage facility are sealing wheat reserves to bolster sagging prices.

The Great Depression...Farm Bred & Farm Led

"I have 8 head of children and my wife. We work hard but I am not able to take care of them. I have children of school age . . . I am not able to school them. My family are in bad shape, they are naked and barefooted."—Letter to the Secretary of Agriculture, December 13, 1921.

"This fall not only will I lose my home and everything in it, but hundreds, perhaps thousands, will be in my condition, homeless. Unless the farmer gets 35 cents to 40 cents for his cotton, we will all be ruined . . ."—Letter to President Harding, 1921.

The Great Depression enveloped the country in the late 1920's, but farmers felt the gloom and despair years before. In June and July of 1920 farm prices started to fall precipitously. Country banks and family-owned businesses in small towns began to sink into bankruptcy.

Synthetic prosperity. The cities, however, continued to bask in the glow of a synthetic prosperity until 1929

The desperation of the Depression is mirrored in the faces of families wandering, homeless, and jobless.



when the bottom dropped out of the world with the collapse of the stock market. Speculators jumped out of windows, joining the country bankers who committed suicide. The sickness of the countryside had spread to the cities. As a writer in the 1930's put it:

"In the fact that farmers were less and less able to buy the things that the people in the cities were making, lies the explanation of how one surplus caused another, until farmers were burning wheat while bread lines lengthened in the cities, until the fantastic spectacle of poverty in the midst of plenty traversed America like a dance of death."

Taxes were delinquent, schools were closed, hoards of unemployed and hungry milled around in the cities or took to the roads. The well-

fed felt threatened by the hungry, and planned routes of escape in the event of a strike or a revolution.

Militant farmers. Faced with a loss of homes and livelihood, some once prosperous farmers became militant and desperate and turned to violence. Pickets, barricades, and threats were used to keep food from markets. Grim-faced mobs converged to halt foreclosure sales, their determination signaled by pitch forks and nooses hanging from a tree.

Law enforcement officers, lawyers, judges, and prospective bidders were threatened and even manhandled. The president of the American Farm Bureau Federation warned, "Unless something is done for the farmer we will have revolution in the countryside within less than 12 months."



Farming for World Markets

by Arthur B. Mackie

American farmers got into the export business more than a century and a half before the Declaration of Independence.

It started back in 1613 when colonists shipped 2,500 pounds of tobacco from Jamestown, Va., to England. Three centuries later, farm products still made up the bulk of our exports. And in the 1970's, foreign sales are more important than ever before.

This trade has helped shape the economic landscape both here and abroad. Throughout our national history, farm exports paid for most of our imports. They provided the capital needed to support industrial development and they paid for amenities that made life more pleasant in a young Nation.

Industrial revolution. American cotton and other agricultural raw materials helped fuel the industrial revolution in Great Britain in the 19th century. Today, U.S. feed grains are making it possible for Japan and other nations to build livestock industries that are upgrading their diets.

The food-short nations of the world have regularly turned to the American farmer when crop failures, the disruptions of war, or natural calamities



threatened famine. American-produced foods helped tide Europe over the food shortages of 1790-1807 caused by the Napoleonic wars and poor crops. In the 20th century, American food aid reached gigantic proportions after each of the two great world wars. And in the last 20 years food assistance programs have played a vital part in the economic growth of the developing nations.

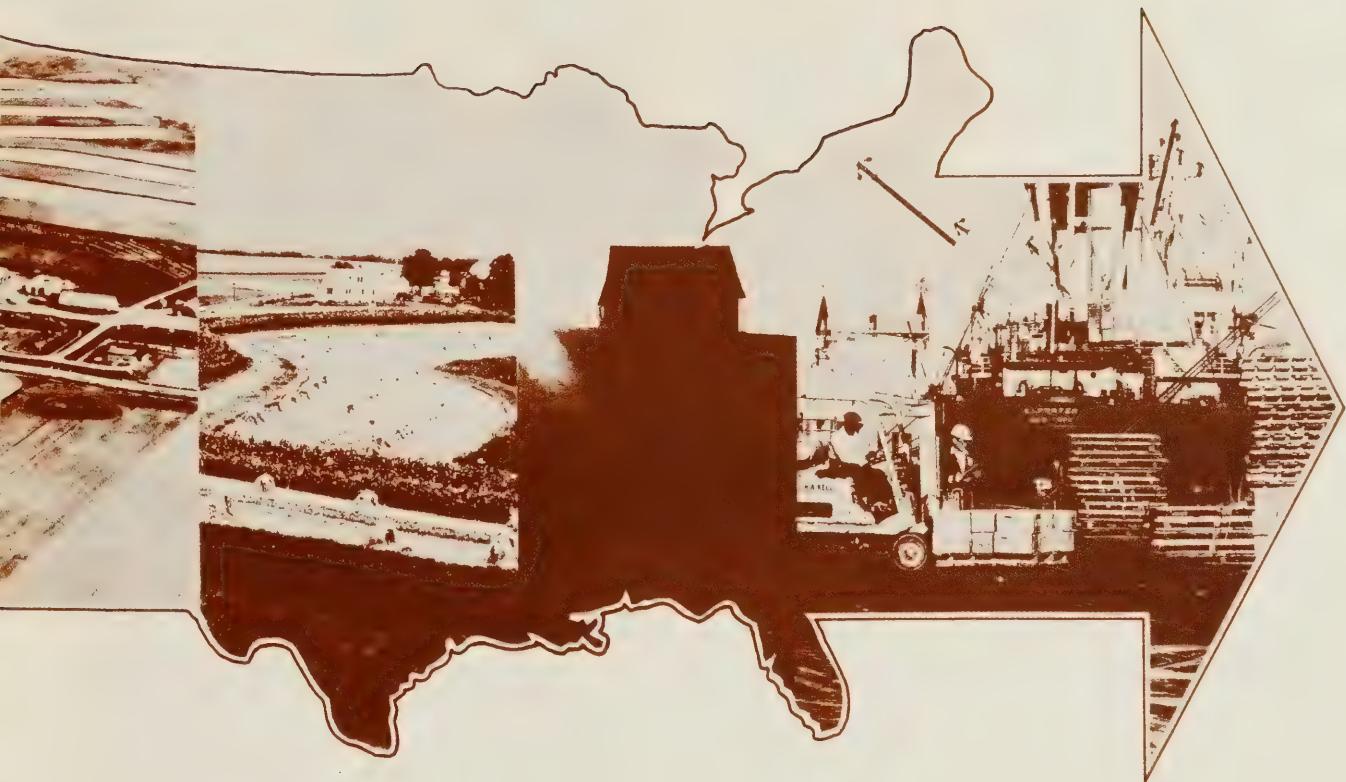
Shifting demands. All of this has had a decided impact down on the American farm. The shifting demands of world markets have helped determine the kinds of products our farmers produce, the prices they receive, their incomes, and thus their standard of living.

Foreign demand for American farm products during the past 200 years has undergone major changes—shifting to food and feed from raw materials such as cotton, tobacco,

hides and skins, which historically made up the bulk of agricultural exports.

In colonial days, tobacco accounted for 36 percent of the agricultural exports, which made up 75 percent of all exports. Tobacco was grown primarily in Virginia, the Carolinas, and Maryland. Rice and indigo, from South Carolina, accounted for another fifth of the agricultural exports of the original colonies.

European competition. After the Revolution, American tobacco, indigo, and naval stores no longer had a monopoly of the British market and had to compete in other European markets. As a result, exports of tobacco and indigo declined while exports of foodstuffs increased. New York, New Jersey, and Pennsylvania—the “bread basket States” of those days—and New England, where considerable quantities of beef, pork and live



animals were produced, became the leading export States.

With European economic recovery after the Napoleonic wars, American cotton exports rose rapidly to become the leading export commodity—a position it held until 1945, when wheat shipments took over.

Cotton exports. Great Britain was our most important cotton customer from 1815 to 1860, although quantities were also shipped to other European markets. The value of cotton exports rose from about \$18 million to \$192 million by 1860. In that year cotton accounted for three-fourths of agricultural exports and three-fifths of total merchandise exports.

Farm exports had a lot to do with the Civil War. Many Americans in 1861 believed that the outcome of the war might depend upon England's demand for cotton. It was thought that England would recognize the

Confederacy to obtain cotton, thus improving the South's chances of winning the war. But England was also interested in American wheat as a result of crop failures there and in most of Europe. Consequently, American wheat exports rose from 4 million bushels in 1860 to an average of 35 million bushels during 1861-63.

Vast new lands. As railroads pushed across the prairies and into the Great Plains after the Civil War, new lands were opened for commercial wheat production. Large-scale, mechanized wheat farming developed in the Red River Valley in the 1870's and then spread westward. Today 80 percent of the wheat is produced in 10 States west of the Mississippi River.

In 1886, the Nation grew 170 million bushels of wheat; in 1890, 655 million bushels; in 1974, 1,793 million bushels. Sixteen million bushels were exported in 1866, 102 million in 1900,

and 956 million in 1974.

Tobacco, the colonial king of American commerce, had lost its place as a leading export by 1800, although the shipments abroad continued to increase slowly and irregularly. But growth in the post-World War II years has been slow.

Industrial demands. Increasing industrialization in Europe as well as in the U.S. marked the period from the Civil War to the end of the century. The result was a greater demand for farm products, since factory workers needed food and mills needed cotton. The farmers of America could supply both.

There was also an American agricultural revolution that centered around the Civil War. This first of agriculture's revolutions saw passage of the Homestead Act, the establishment of the Department of Agriculture and the Land Grant Colleges,

and the increasing mechanization of agriculture, marked particularly by the substitution of animal power for manpower. These and related developments led to greatly increased production at lower unit costs. The costs of mechanization and of adopting improved methods made the farmers more dependent upon markets.

Foreign markets. At the same time, foreign markets were taking an increasing share of our farm production, especially cotton, tobacco, wheat, and meat products. From 1869 to 1900, the home market absorbed about 82 percent (by value) of farm products sold and the foreign market about 18 percent. Currently, foreign markets take about a fourth of all U.S. farm products produced, including over 50 percent of our wheat, rice, and soybeans.

U.S. farm leaders from the beginning recognized the importance of the export market. Studies of area markets for particular crops were made early in USDA's history. These led to establishment of a Section of Foreign Markets, the forerunner of today's Foreign Agricultural Service.

Fuel industrial growth. Agricultural exports, which accounted for three-



Overseas market development has a long history. Here, Americans drum up business at the 1889 Paris Exposition.



Cotton, the fifth-ranked U.S. agricultural export commodity, has been a major foreign market item for nearly 2 centuries. This wagon load was picked in 1939 in Mississippi.

fourths of all exports between the Civil War and 1900, helped supply the capital needed for the rapid growth of industry. Even though they now make up a much smaller share of total exports, they help to offset rising costs of oil imports and to improve our trade and payments balances, thus, indirectly strengthening the national economy.

U.S. exports declined between 1900 and World War I, as a result of increasing nationalism in Europe, increasing competition from other nations, and a better balance between consumption and production in the U.S. But the picture changed dramatically with the outbreak of the first World War.

A billion bushels. England and France began to buy food grains and arrange for credit. Exports of wheat jumped from 92 million bushels in 1914 to 260 million bushels the following year. The 1915 crop was the Nation's first of over a billion bushels.

During the next 2 years both production and exports of wheat declined greatly because of bad weather and a shift in European demand to meat products.

Exports of meat and meat products soared from \$132 million in 1915 to

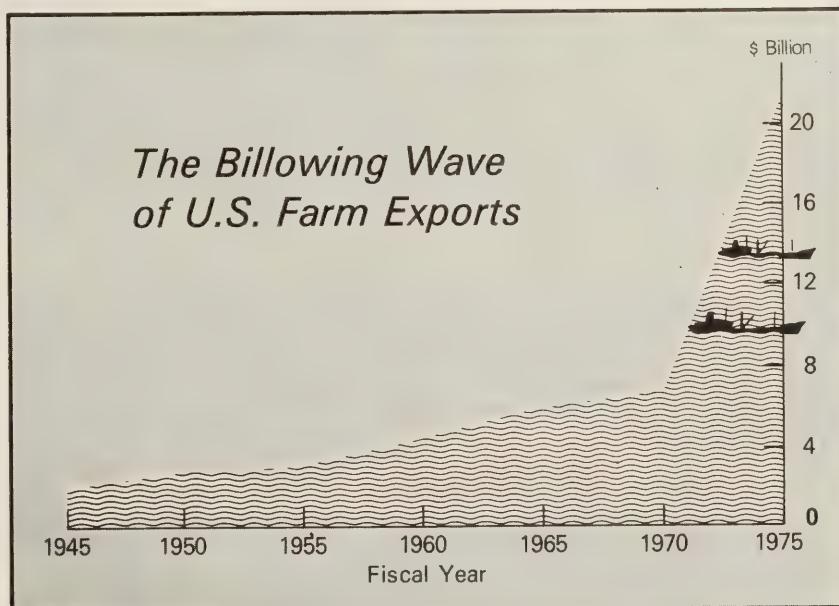
\$698 million in 1919. Wheat exports did not reach the 1915 level until 1921.

Cotton also felt the impact of wartime changes in demand. The 1914 crop was 16 million bales, the largest on record at that time, but exports fell over a fourth and prices declined sharply. Prices began to improve in 1917, and by 1919 they had improved sufficiently to make this year remem-

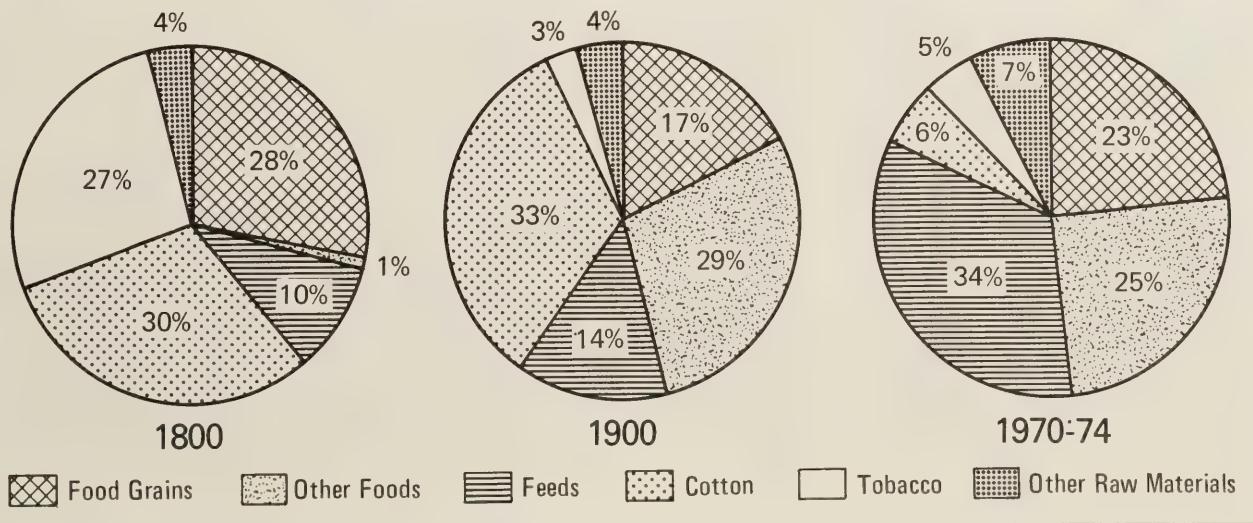
bered as the year of the \$2 billion cotton crop.

Peace slump. Peace brought a slump in foreign demand. The volume of agricultural exports fluctuated about one-fifth below the wartime peak of 1918-19 from 1921 through 1929, when the onset of the Depression caused a further severe decline.

By 1934-35, volume was nearly 60 percent below the 1918 level. There-



The Changing Mix of U.S. Farm Exports





Human needs, which are ultimate targets of U.S. aid projects, are exemplified by these children in Nepal.



This 100,000-ton wheat shipment being loaded in a U.S. port will ease starvation in a developing nation.



A wooden plow in Morocco shows lagging agricultural technology.



Children in a drought-stricken African nation depend on U.S. food supplies for survival until local crops improve.



An Israeli farmer picks cotton grown with U.S. technical advice.

after, it increased slightly until World War II. The annual value of exports was around \$2 billion from 1924 until the Depression, and then fell to about three-quarters of a billion annually until World War II began.

Product mix. Changes in foreign demand for U.S. agricultural products in recent years have altered the product mix of our exports that had existed for over 150 years. It featured a sharp drop in exports of agricultural raw materials for industrial use and a dramatic rise in feeds and feed grains. Food exports have fluctuated over our 200-year history.

In 1925-40, cotton and tobacco accounted for 55 to 60 percent of our farm exports, while feed grains and soybeans made up less than 5 percent. By 1970-74, cotton and tobacco's share had fallen to about 11 percent and that of feed grains and soybeans had increased to about a third. During this time, exports of food grains (wheat, flour, and rice) increased from about 10 to 23 percent of the total.

Raw materials. In the 1920's and 1930's, about 60 percent of U.S. farm exports were agricultural raw materials. During World War II, however, food exports increased to 77 percent while the proportion of raw material items declined to 20 percent.

Since the war, the proportion of food exports has declined but has remained substantial, averaging 48 percent in 1970-74 or about the level of 1900. The proportion of raw materials has eased down to 18 percent.

Future changes in world demand should continue the trend toward an increase in the export share of feed relative to food products.

Foreign economic growth. The changed composition of U.S. farm exports reflects the impact of sustained economic growth in Japan and Western Europe the last 2 decades. Consumption has become more diversified and specialization of production has increased, affecting the level and commodity composition of trade between most countries. The ability of the countries to meet their rapidly growing demands for food and feed has varied greatly by country, depending upon the supply of agricultural land and other resources.

Japan imports feed. For example, Japan, with its limited supply of agricultural land, has relied heavily upon imports of feed products, especially from the U.S. Western Europe, on the other hand, has much more land resources for agricultural production. These countries are able to produce a large proportion of their total feed consumption. However, some other countries may be approaching the limits of their land resources, and will be forced to turn increasingly to the American farmer



Turkish farmers enjoyed a good peanut harvest in the mid-1960's, thanks to tips on fertilizer use from U.S. experts.



Italians view U.S. farm products at trade fair in Milan.

for more of their food and fiber needs.

Agriculture's most dramatic contributions to our economic growth were in the earlier stages of our development. However, farmers will continue to provide a firm underpinning to our economic growth and well-being.

Dynamic contributions. In the years ahead, American agriculture will almost certainly continue to make dynamic contributions to world economic growth. This is not a new role.

During the first half of the 19th century, the combination of Eli

Whitney's cotton gin and the cultivation of new lands in the South provided Britain's rapidly expanding textile industry with abundant supplies of cheap cotton. During this period these exports made a key contribution to the industrial takeoff in Great Britain, which centered on the direct and indirect consequences of the rapid expansion of cotton textiles.

Aid developing nations. American agriculture will continue to help foster economic growth in the more developed countries. But the most dramatic contributions are likely to be to the underdeveloped countries, whose populations account for about 3 billion persons out of a world total of some 4 billion.

Rising levels of output and income in the poorer countries, from whatever source, generally increase the demand for the products of the more developed countries.

The ensuing trade will influence the pace of economic development in both groups of countries. The U.S., along with other advanced industrial countries, has an important stake in both world economic development and the expansion of international trade in agricultural products.



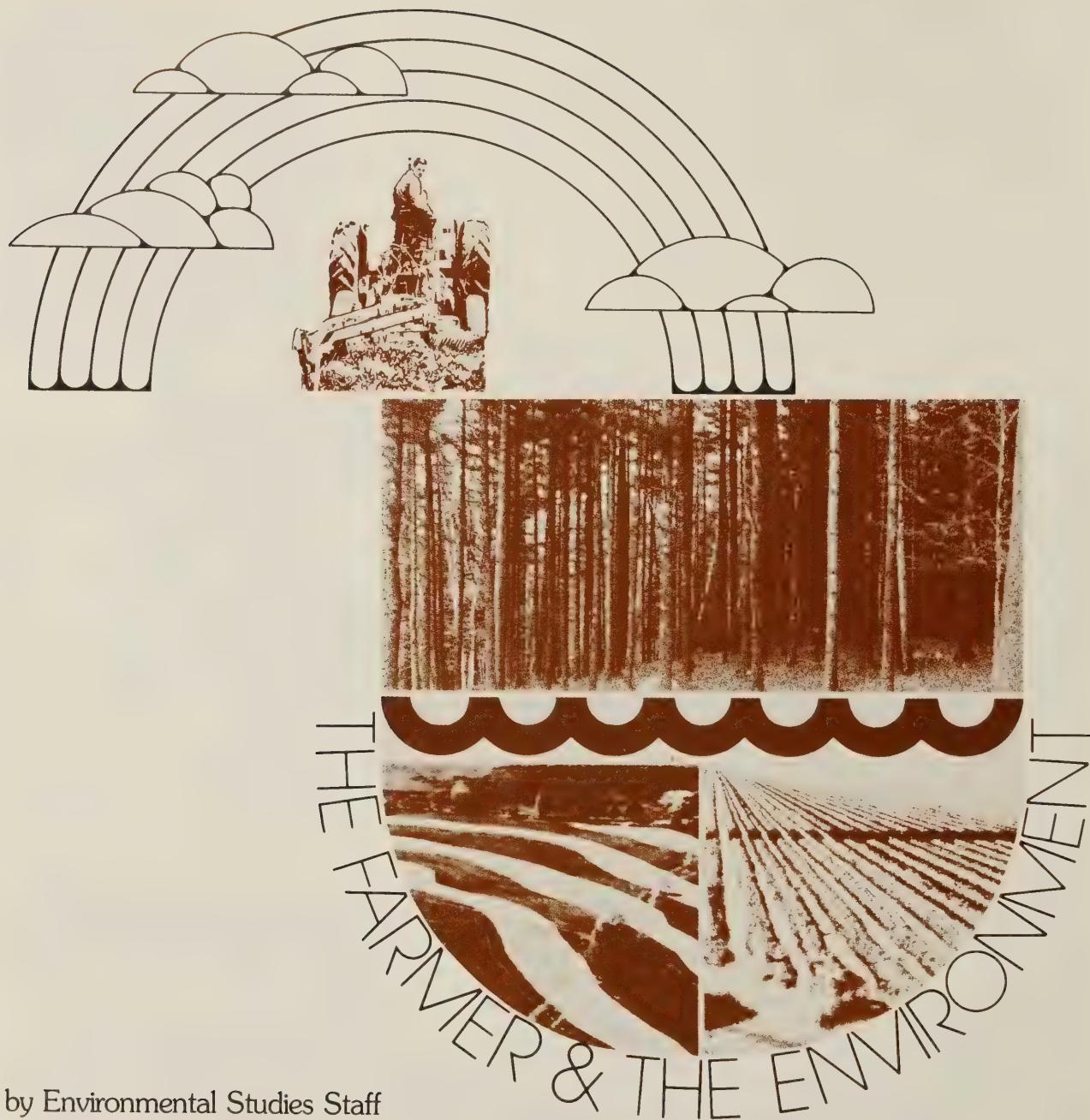
The growing Japanese dairy industry, stocked with U.S. breeding cattle, is a swelling market for U.S. feed grains.



An ocean voyage awaits these American cattle as they are driven aboard a transport ship. Farm exports shore up the U.S. balance of trade and strengthen the dollar against inflation.



CHAPTER 10



by Environmental Studies Staff

Farmers always have lived on intimate terms with their surroundings. A deep respect for the land is a hallmark of rural people everywhere.

Early in the 19th century, rural concern for the environment found expression in the study of nature. Spurred by spontaneously organized local clubs, and curious individuals as well as by schools and universi-

ties, interest became intense in the days of Thoreau and Emerson.

After the fashion of the times, scientific interest in nature study was strongly mixed with romanticism and theology. Nature study was considered not only intellectually stimulating but spiritually uplifting as well. It inspired many a poem, painting, story, and sermon.

Farmers were urged to beautify their homes with flowers and trees. The *Cultivator* expressed a widely held view when it advised its readers in 1842 to "remember that every tree, shrub and flower he cultivates, constitutes a new link of attachment to bind him to his home, and render that home more delightful. They multiply our means of enjoyment, they make additions to our stock of knowledge, they invite us to a more intimate communion with nature, and they prevent the concentration of the mind on wealth, and the narrow self-

ishness that is too often its attendant."

More practical turn. By the end of the 1800's, interest in the environment began to take a more practical turn. A rapidly growing population and disappearance of the frontier brought home the fact that our agricultural resources were not infinite. The environmental abuses in the wake of rapid industrialization and the growing commercialization of agriculture provided disturbing indications of things to come.

Waste and exploitation of our nat-

ural resources were among the first targets of the environmentalists. They were mainly concerned with the fear of permanent damage resulting from drainage, cutting of forests, plowing of grasslands, and depletion of minerals and fuels.

One of the first accomplishments of the early environmentalists was the Forest Reserves Act of 1891 under which nearly all of our present national forests were created.

Though environmentalists had long been concerned about erosion, an effective soil conservation program was not undertaken until New Deal days with the passage of the Soil Conservation and Domestic Allotment Act in April 1935 and February 1936. This legislation established the Soil Conservation Service (SCS) and the farmer-elected (ASC) committee system. It also authorized payments to farmers for soil and water conservation practices through local and State committees.

The idea of soil conservation received powerful support as a result of the dust storms during the droughts of 1933 through 1936. Huge clouds of dust rising thousands of feet into the air from plowed fields of the plains and drifting as far east as the Atlantic seaboard convinced millions of the need for action.

In agriculture, new pollution problems arose mainly from shifts to more intensive crop production systems and increased concentration of livestock operations. Major sources of potential pollutants from agriculture include pesticides, fertilizers, feed additives, and residues and wastes from crop and livestock production. Additional pollutants from agriculturally related activities such as the processing of food and fiber include organic waste or sewage, particulate discharges in air, and other discharges that can degrade the quality of the environment.

Concerning agriculture. Most environmental concerns, actions taken, and laws passed that affect agriculture most directly have dealt with water pollution and pesticides. Agriculture is not a significant contributor to air pollution, though the burn-



An industrial plant dumps its waste in the Ohio River.



Strip mining for coal worries farmers and environmentalists.



Polluted water drains from a feedlot. Controlling such runoff could require beef operators to invest large sums in runoff control facilities.

Defending The Land

by Gerald R. Ogden

When pioneers plunged into the American wilderness, they found vast expanses of land just waiting to be tamed by wooden plows.

An abundant future lay just over the next hill, if only the settler could survive Indian attacks.

Finding land wasn't so much of a problem, of course, as clearing it. A clearing carved out by a single farm family was the merest dot on the face of a continent. Eastern woodlands were so thick that travel was greatly impeded. Western plains were covered with shaggy seas of buffalo, and snow-capped mountains sent clear rivers roaring into the valleys and plains below.

Few early settlers could have imagined that much of this wilderness would vanish within two centuries.

But land was cleared and stripped; sewage and industrial wastes poured into the roaring rivers; and hunters turned the sea of bison into a waste of bleached bone.

At the turn of the 20th century,

Americans awoke to behold great environmental losses. From that awakening grew the modern conservation movement.

President Theodore Roosevelt, a boisterous leader who ballyhooed his love for the outdoors, was among the early conservationists.

Although historians suspect underlying political motives for his conservationist utterings, Roosevelt nevertheless extolled the conservation viewpoint and stirred the Nation's conscience.

Influencing Roosevelt were W. J. McGee, Gifford Pinchot, and George H. Maxwell.

Pinchot, called the "spiritual leader" of early 20th century conservationists, was the first forester of the U.S. Forest Service. His interests also included soil and water conservation. After Government service, Pinchot headed the National Conservation Association.

W. J. McGee, a self-educated anthropologist, hydrologist, and geologist, championed irrigation and inland waterways. As the little-heralded scientific leader of Rooseveltian conservationists, McGee sought improvement and preservation of the Nation's waterways.

George H. Maxwell, another drum-beater for wise water use, started the National Irrigation Association and headed the drive for the Reclamation Act of 1902. He urged flood control and Federal regulation of inland waterways. Maxwell continued his fight until his death in 1946.

George P. Marsh trumpeted conservation long before Roosevelt. In *Man and Nature* in 1864, he blamed mankind for changing the physical condition of earth and urged proper land use to preserve natural resources. Called the father of modern conservation by some historians, March's work served as a valued reference for later conservationists.



Tipping his hat, Teddy Roosevelt touted conservationist's causes.

Smithsonian Institute Photo



Rachel Carson warned Americans of a catastrophic "Silent Spring."

Hugh H. Bennett, founder of the Soil Erosion Service (today's Soil Conservation Service), led the 20th century soil conservation movement. Under his guidance, his agency reclaimed land in the West and Midwest in the Depression era.

Mabel R. Edge, lover of birds and wildlife, formed the Emergency Conservation Committee in the 1920's to promote wildlife preservation. In her 30-year tenure as chairwoman, she campaigned for sanctuaries, published pamphlets on resource issues, and led conservation causes as a propagandist.

Rachel L. Carson's book *Silent Spring* warned Americans of dangers of chemicals to the ecosystem. Conservationists rallied behind her, to breathe new life into the languishing conservation movement.

While many others may boast equally impressive credentials, these men and women exemplify the Americans who stepped forward to defend the land.



Airplane vs. the Bug

The insect has always been one of man's most persistent and potentially dangerous enemies. Around the turn of the century, farmers fought the bug with hand-held spray guns. Although generally effective, that was time consuming and tedious.

Toward the end of World War I, something better appeared on the horizon—the airplane. The original experiment on Aug. 3, 1921, involved a grove of catalpa trees in Troy, Ohio, which had been attacked by the sphinx caterpillar. The dusting experiment, conducted by the Ohio Agricultural Experiment Station and the Army Air Service, was a success. This led to experimentation on controlling the leaf worm and boll weevil in cotton fields.

The first commercial firm to take advantage of aerial dusting was Huff-Deland Dusters, headquartered in Macon, Ga., which opened for business in 1924 to treat cotton fields in the South.

By the end of 1925, Huff-Deland had dusted more than 60,000 acres of cotton. Realizing that the cotton problem was only seasonal, they began research on the treatment of Georgia peach orchards.

For almost the next 20 years, dusters experimented with various types of improved aircraft equipment and insecticides in different

parts of the U.S. and Europe, but there were few real improvements until World War II.

During the war years the airplane became an invaluable pest-control vehicle. U.S. and Allied troops fighting in the Southwest Pacific, as well as other areas, were threatened by dangerous malaria-bearing mosquitoes. Aircraft were able to spray streams of DDT over many inaccessible breeding areas, to keep the insects in check.

After the war, the airplane became a more and more effective tool for controlling insects. In 1958, nearly 21 million acres of cropland were dusted or sprayed by aircraft.

Only in the last decade has there been any effort to protect the environment from widespread and indiscriminate application of insecticides. Publicity in the spring and summer of 1964 about the large numbers of fish killed in the Midwest by insecticides caused a loud public uproar. As a result, Congress appropriated \$22.5 million that September for USDA to research the biological controls of insect pests and to develop chemicals that will control pests without harming other forms of life.

[Based on "Origins of Aerial Crop Dusting" in *Agricultural History* by Eldon W. Downs, Aerospace Studies Institute, Air University, and George F. Lemmer, U.S. Air Force.]

ing of crop residues and the emission of dust from grain elevators and cotton ginning operations sometimes cause problems. But farmers, especially those on the urban fringes, are sometimes victims of air pollution from nonagricultural sources.

Public concern about environmental abuse became intense after the publication of the book, *Silent Spring*, by Rachel Carson in 1962. It soon found expression in a series of Federal laws, including the Water Quality Act of 1965, the Clean Water Restoration Act of 1966, the Federal Air Quality Act of 1970, and the Environmental Policy Act of 1970. The Environmental Protection Agency (EPA) was established in December 1970 by a Presidential Reorganization Plan.

In 1972, two other environmental laws were passed that are extremely important to agriculture: The Federal Water Pollution Control Act and the Federal Insecticide, Fungicide, and Rodenticide Act, Amendments of 1972.

The objective of the Water Pollution Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

Main impact. One of its main impacts on agriculture involves *point sources of pollution* such as feedlots and agricultural processing plants that may discharge wastes directly to receiving waters. It requires that operators apply the "best practical" effluent control technology by 1977 and use the "best available, economically achievable" technology by 1983.

The Act also calls on the States to identify and develop guidelines dealing with *nonpoint sources of pollution*, consulting with Federal agencies.

The Pesticides Act provided important amendments to registration procedures and the mechanisms for administrative hearings on refusals to register, changes in classification, and suspension and cancellation of pesticides.

In addition, the Act authorized EPA to place pesticides in a "restricted use" category, thus subjecting them to controls in distribution



Pollution by other industries often hits agriculture. Here, bad air has killed good timber.

and ultimately requiring their use only by trained applicators.

Currently, public attention is focused on the following environmental issues in agricultural and rural resource areas:

Pesticides. Most pesticides fall into three major categories: insecticides, herbicides, and fungicides. They are fundamental to the agricultural production system. Farmers rely on them to protect their plants and animals. They help insure efficient production of high quality food and fiber. Farmers spend about \$5 billion a year for pest control, of which \$3 billion is for pesticides and their application.

There are concerns about the effects of some pesticides on human health and on the environment. Some remain in soil and water for long periods of time. Their residues are hazardous to some fish and wildlife. They have a tendency to accumulate in the fatty tissue of warm-blooded animals, including man.

Cancelled products. Some pesticides have been banned. Following a public hearing, EPA cancelled interstate shipment of DDT for all uses except public health and a few minor agricultural uses effective December 31, 1972. Compound 1080, used for predator control, was banned by Executive Order in 1972. Uses of aldrin and dieldrin were suspended in 1974.



Typical scene of air pollution by industry, Wash. Co., Ohio.

Hearings on the suspension of chlordane and heptachlor are underway, and other pesticides are under review by EPA.

The costs to farmers as well as the benefits to society of banning or restricting the use of pesticides, such as DDT, are difficult to assess. Farmers may change production practices with resulting changes in input costs. Production may be raised or lowered, affecting the farmer's earnings.

The adoption of substitute chemicals, or biological and cultural pest control practices, poses unknowns as to costs, effectiveness, and even possible hazards. The costs of such envi-

ronmental actions must be weighed against the benefits to human health and the environment. Furthermore, as is often the case when new technology is adopted, unforeseen costs as well as benefits are liable to crop up.

Nonpoint pollution sources. Potential sources of surface and ground water pollution include sediment, farm chemicals, and plant and animal wastes and residue from cropland, grazing areas, and farm woodlots.

Currently, EPA has no direct authority to prescribe onfarm agricultural practices to reduce potential pollution from nonpoint sources.



Cause unknown, but some 300 fish died in this accident.

However, it does have authority to approve area-wide waste management treatment plans under Sec. 208, PL 92-500. Sound management practices geared to the needs of the individual farm or region are often the key to avoiding this kind of pollution.

As far as agricultural practices are concerned, the 1972 Water Act is limited to (1) research into methods to reduce pollution (primarily erosion) from agricultural practices, (2) identifying the nature and extent of agricultural pollution, (3) requiring the States to report on how they intend to deal with the problem, and (4) approving area-wide waste management plans developed at the local level.

Sediment. The soil materials carried to streams by runoff affect the uses of streams as sources of water and recreation and the contribution of streams to the natural environment. In addition, the amount of other pollutants in streams—such as pesticides, salts, plant nutrients, animal waste, crop residues, and infectious organisms—is directly related to the amount of soil lost through runoff. The sediment load in streams is both an urban and rural responsibility since a large portion of the sediment load comes from urban areas.

Environmental concern about sediment control emphasized the down-

stream effects on people and resources. In agriculture, however, the goal of soil conservation has been to hold soil loss to rates that are offset by the formation of new soil.

Farmers can use improved tillage systems to adequately control water erosion on many soils. Also effective are crop rotations, minimum tillage systems, and conservation practices such as cover crops, contour farming, and strip-cropping.

Price and income relationships have limited the ability of farmers to invest in soil conserving measures. High production costs may encourage intensive land uses at the expense of soil conserving practices such as grassland and forage production.

Farm chemicals. Nutrients contained in commercial fertilizers may find their way into surface and ground water. This causes environmental concern because algae growth in surface waters will be stimulated and high concentrations of nitrates in ground waters may result. However, it is extremely difficult to identify the extent to which natural and applied plant nutrients may contribute to water pollution.

Nutrient losses from agricultural operations can be thwarted by: (1) applying nutrients in a way that insures efficient use by plants, (2)

adopting cultural practices that minimize nutrient losses, and (3) reducing runoff by conservation measures.

Pesticides enter water by several means—including erosion, runoff water, and evaporation and redeposition—but the major method of conveyance is probably by erosion. Thus, good erosion control methods will reduce the delivery of pesticides to water. Minimizing wind drift, applying minimum amounts needed, substituting nonchemical methods of pest control and using biodegradable pesticides, are other alternatives to reduce quantity of pesticides entering surface and ground water.

Animal wastes. Animal waste problems result not only from direct deposits by the livestock on pasture and rangeland. More important, they intensify in feedlots—both from accumulation and runoff. Proper spreading of animal wastes provides nutrients for crop production and also reduces pollution potential from surface runoff. Effective management practices include: (1) spreading manure more uniformly on land; (2) applying feedlot runoff effluent on land; (3) maintaining an adequate land-to-livestock ratio on pastures; and (4) locating feeders and waterers a reasonable distance from streams and water courses.

Point source pollution. EPA has established effluent guidelines for control of surface water pollution from point sources (defined as a single, identifiable source of pollution).

Feedlots. Effluent guidelines for large feedlots were announced in April 1974. They apply only to operations with 1,000 steers or heifers, 700 dairy cows, or 2,500 hogs.

ERS estimated that the investments required to meet these regulations would have no major impact on livestock industries. Since the EPA guidelines are performance rather than design standards, feedlot operators can select from several different types of runoff control systems.

Currently, EPA is examining alternatives to specifically include larger numbers of smaller feedlots under their effluent guidelines. If the alter-

natives are implemented, the livestock industries would be required to increase investments for pollution control. A stringent interpretation of these revised regulations could up investments for runoff control by \$200-300 million and could affect supplies and prices of some livestock productions in the near term.

Agricultural Processing. Agricultural processing firms are required to comply with Federal and State standards for pollution control. These firms handle products with a retail value of more than \$100 billion.

Studies indicate that the impact of pollution abatement will vary greatly among industries. It will depend on their ability to minimize costs and adopt new technology, particularly for byproduct utilization of recovered wastes. If markets for such wastes can be developed, the net cost of waste treatment will decline.

Sludge and solid waste. As efforts to clean up our air and water are intensified, attention turns to land. As a repository for wastes, it is a formidable problem. Solid wastes in 1969—primarily sewage sludge, garbage and trash—amounted to 250 million tons. Management of this waste cost municipalities about \$5 billion in 1973.

Farmers will, of course, be directly involved in land disposal of wastes, whether in dumps or modern systems to recycle effluents and sludges to

land under controlled systems.

An example of the latter is the land treatment system being used in Muskegon, Mich. It combines wastewater renovation and crop production. It uses 10,000 acres, 6,000 of which are irrigated cropland. For smaller communities, only several hundred acres would be required; but for metropolitan areas, more than 100,000 acres would be needed.

Coal and oil shale development. The energy crisis is causing many problems for farmers, including the high cost of energy and impacts on their environment. Great pressure is building for rapid development of coal resources, especially through open pit or strip mining.

Questions are being raised as to how rapid and extensive such development can be without causing unacceptable consequences to farmers, ranchers, rural people, and the environment.

Questions of direct interest to farmers: How much land would be torn up and whose land? How much water is available and how would its use in mining or energy processing affect agriculture? Can strip-mined land be reclaimed and how should it be done? What is a reasonable cost for reclamation? When should reclamation occur—concurrently with mining or after the mine is exhausted? Answers to these and other questions are needed to evaluate the

Severe gully erosion denudes vegetation in California.



tradeoffs between benefits of coal and shale development and the environmental and social consequences.

Who pays? When it comes to the question of who pays, the farmer having to adopt a pollution control practice may find that he is footing the bill. In this respect he generally is at a disadvantage compared with most industrial firms because of the large number of farmers and the competitive structure of agriculture. Individually, he has little or no ability to pass the increased cost on to consumers.

Because of the diverse and widespread nature of farming, getting at pollution problems through regulations usually affects some farms or areas more than others. In fact, the incomes of farmers in areas not severely affected will even increase if overall production is reduced and farm prices go up.

For example, a restriction on the pesticide aldrin used by corn farmers may increase production costs for those growers with soil insect problems because alternative pest control practices are more costly or don't work as well. Farmers who have not needed aldrin for insect control may benefit from higher corn prices if total production of corn is reduced.

Consumers would suffer. Consumers, however, would have to pay higher prices for livestock and other products that depend on corn. The reduction in corn production could also affect our balance of payments because high prices may force foreign buyers to reduce their purchases.

There are ways of offsetting some of the farmers' costs in complying with environmental regulations. Various public programs provide assistance through research, technical advice, loans, and cost sharing. For example, the Soil Conservation Service assists in designing some animal waste control facilities and erosion control structures. The Agricultural Stabilization and Conservation Service also administers a cost-sharing program for soil, water, woodland, or wildlife conservation and the prevention or abatement of agriculturally related pollution.



Out of the Dustbowl

On April 2, 1935, the afternoon sky suddenly darkened over Washington as a swirling cloud of dust blew in from 2,000 miles inland. For Hugh Bennett, who was testifying before the Senate when the storm appeared, the disaster of the Plains was a tragic vindication of his repeated warnings about soil erosion.

As head of USDA's Bureau of Soils, Bennett had long been an advocate of a permanent soil conservation program, arguing that erosion was a national menace demanding immediate action.

If Bennett had not swayed other officials before this, the sight of mid-western soil gritting in the teeth of eastern city dwellers was more than convincing. Twenty-five days later, Congress directed the Secretary of Agriculture to establish a Soil Conservation Service, which he did the same day. Bennett was named head of the new agency.

Prior to the eastward march of the dustbowl, erosion control had been approached as an unemployment relief measure. In 1933, the National Industrial Recovery Act authorized erosion projects as useful work.

When the NIRA program was enacted, Bennett was determined that no simple, mechanistic solution, such as terracing, should be adopted as the answer to every situation. To him, saving the land took precedence over all else. He urged an integrated attack against erosion, using all known soil protection techniques.

But he needed money to implement his plans. Earlier, \$5 million from the Public Works Administration had been allocated to a soil conservation program to be carried out with relief labor by the Bureau of Agricultural Engineering. Through his efforts, the funds were allocated instead to the Department of the Interior, and Bennett was given a leave of absence from USDA to head up Interior's program.

At that time, many Agriculture officials viewed erosion control as a temporary, emergency project under the direction of the Public Works Administrator and the Interior Department. However, the Interior Secretary had other ideas. He set up the Soil Erosion Service within his department, and some time later President Roosevelt decided the serv-

ice should be transferred to USDA.

It was drought that convinced Congress that erosion work should continue as a permanent program. After a series of dry years climaxed the Depression in the Great Plains, dust storms began moving eastward, prompting the legislators to establish the Soil Conservation Service as a permanent agency.

With Bennett at the helm, the new Soil Conservation Service greatly expanded Interior's old programs and encouraged active farmer participation.

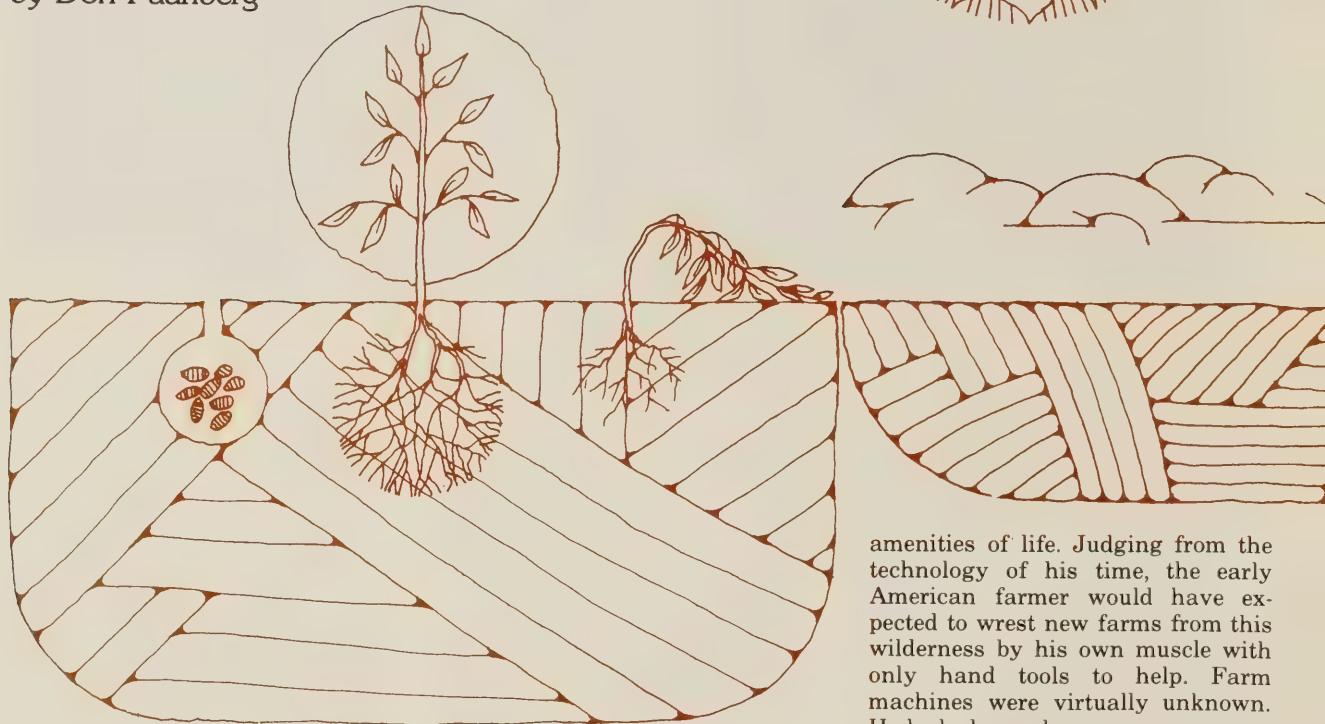
Based on a Texas law aimed at wind erosion, model legislation was drafted setting up soil conservation districts as governmental subdivisions. Similar laws were later adopted by the States upon a majority vote of landowners and land operators.

Through this local network, the Soil Conservation Service has conducted its program for three decades. Today, more than 90 percent of the nation's farmland is included in self-governed soil conservation districts.

[Based on special material from Wayne D. Rasmussen, National Economic Analysis Division.]

Farming in the Third Century ...and Beyond

by Don Paarlberg



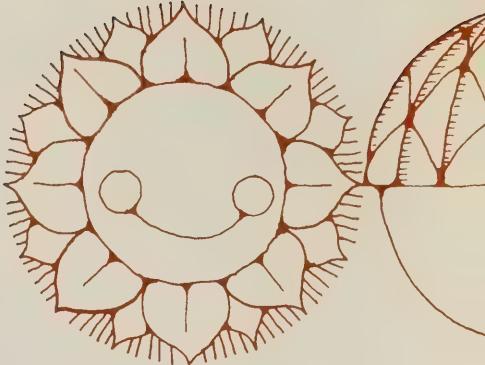
Of one thing we can be sure—whatever may be the technical developments in agriculture, its poetry will continue. The wonders of life, growth, and death, the cycle of the seasons, the marvels of continuous creation so clearly manifested in agriculture—these will still be with us.

This chapter attempts the impossible. After looking back over our 200-year history, we now try to look ahead to what the next century or two might bring.

The 10 preceding articles in this series demonstrate the difficulty. What farmer in 1776, drawing upon a century and a half of colonial experience, could have in his wildest fancies imagined the world of the 20th century farmer?

For one thing, he would have been too preoccupied with the circumstances of his day to see the underlying trends that would produce the agriculture of the 1900's. He was in the midst of a war for independence that would last 6 long years.

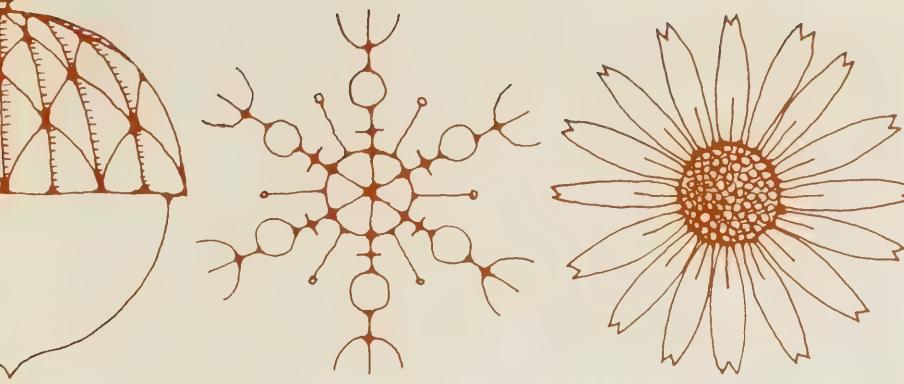
Taming wilderness. Then, too, there was a wilderness spanning a continent to be brought under cultivation. It was without roads, schools, hospitals, or even the most basic



amenities of life. Judging from the technology of his time, the early American farmer would have expected to wrest new farms from this wilderness by his own muscle with only hand tools to help. Farm machines were virtually unknown. He lacked even horsepower.

History tells how the American farmer survived and prospered, using methods he did not foresee to overcome obstacles he could not anticipate. He transformed a wilderness into an agricultural plant of unparalleled efficiency. But, paradoxically, his problems today seem no less formidable than those of 1776.

New problems. They are different problems, of course: pollution of the environment, threatened shortages of energy and raw materials, a burgeoning world population pressing on food supplies, the frenetic pace of technological change. In addition, we are warned of new ice ages to come, or of encroaching deserts. And always there is the underlying fear of nuclear holocaust.



Undoubtedly, our view of the future also is powerfully influenced by present circumstances, some of them undoubtedly transitory. Although we have vastly greater information resources to draw on, the future will yield its secrets no more willingly than in the past.

Fear of failure. But fear of failure should not deter us. Forecasting is a necessary part of the business of living. Our plans and the things we do to realize them assume that the consequences of our efforts are predictable, even while acknowledging that our foresight is less reliable than our hindsight. The bad guess is a part of the game.

Let us begin on the side of the optimists. Scientists tell us that the world probably is some 4 billion years old, that human beings have been on the earth for perhaps 5 million years, and that agriculture began about 10,000 years ago. So, it seems reasonable to project that during the next 200 years, hardly an eyeblink in the larger context of time, the world

will neither freeze nor fry nor choke nor starve nor blow itself up.

Reasonable humans. Let us make the further assumption that the human race is essentially reasonable and is likely to stop an adverse trend somewhere short of ultimate disaster.

What do knowledgeable people think agriculture will be like 200 years from now? Several opinions were sought.

In most cases the thoughts expressed are in technological terms. What kind of farm machinery? Will we be taking our food in the form of concentrated pills? Will we all be computerized? Will we have achieved artificial photosynthesis?

A new age. This orientation reveals the technological bent of our age. But 200 years is long enough for a new age to emerge. Will technology continue to be our major preoccupation? Will it be in some degree replaced by concern for the aesthetic and the spiritual? For many years now, we have moved away from the individual and toward group action. Will this continue, or

has this trend run its course? Will the present institutional arrangement continue for the farm and the non-farm sectors, or will there be change?

Bane or benefactor? Science and technology will no doubt remain dominant in agriculture for many years to come. But even now the previous unquestioned acceptance of science and technology as the benefactor of the human race is being challenged. Science and technology will increasingly be asked to show broad-scale benefits to the human race. The wonders and marvels of new knowledge and of new methods, formerly a sufficient justification, will not suffice. We may conclude, with the Book of Ecclesiastes, that the pursuit of material ends is vanity and a striving after wind. We are likely to make better use of our technological competence in the years ahead, and strike a better balance between things material and things of the heart, the mind, and the spirit.

But science and technology will still be important. What changes might we see?

Wrong side up. The plow, which was the symbol of agriculture during the first 200 years of our country's existence, will gradually be retired. We will rediscover the wisdom of the Indian, who commented the first time he saw a plowed field: "Wrong side up."

The wind and water erosion caused by the plow is incalculable. We will learn to grow crops using minimum tillage. We will learn to control weeds with chemicals that are biodegradable. We will use various kinds of mulches. We probably will have large machines moving over the land, performing agricultural tasks. But these machines will not be pulling huge gangs of plows. What is left of our soil we will try to keep in place rather than sending it flying through the air and drifting down the river.

Possible breakthroughs. What technological breakthroughs might occur in agriculture during the next 2 centuries? Here we can do no more than surmise that some of the presently hoped-for advances will in fact occur. Secretary of Agriculture Butz says that trying for a scientific breakthrough is like drilling for oil—

you never know whether you are 5 feet from a million dollars or a million feet from \$5. Here are some great things that might happen:

Upgrading the protein content of the cereal grains and other crops.

Hybridizing of additional crops, including wide crosses like triticale.

The learning of soil management to permit the use for agriculture of the fragile soils of the tropical rain forest.

Biological rather than chemical control of harmful insects and diseases.

Killing flies. Control of the tsetse fly, the vector of sleeping sickness in Africa, thereby opening up vast areas for agricultural use.

Successful long-range weather prediction and modification.

The use of satellites for worldwide crop reporting.

Extension of the principle of nitrogen fixation to new groups of plants, in addition to legumes, thus cutting down the need for commercial fertilizer.

The desalination of sea water, permitting human habitation and agricultural production in lands now unused.

Conquest of the fuel problem, probably by the use of nuclear energy.

Greater environmental control for both plants and animals, providing more economical production and higher, more standardized quality.

Plant protein. Advances in food technology, particularly the modification of plant protein so as to provide meat-like foods to the many millions who cannot afford those from animals.

The use of microbial action on various feedstocks (such as organic wastes or fossil fuels) for the direct production for feed and food.

Systems of distribution that will minimize the twin problems of overeating and poverty-related malnutrition.

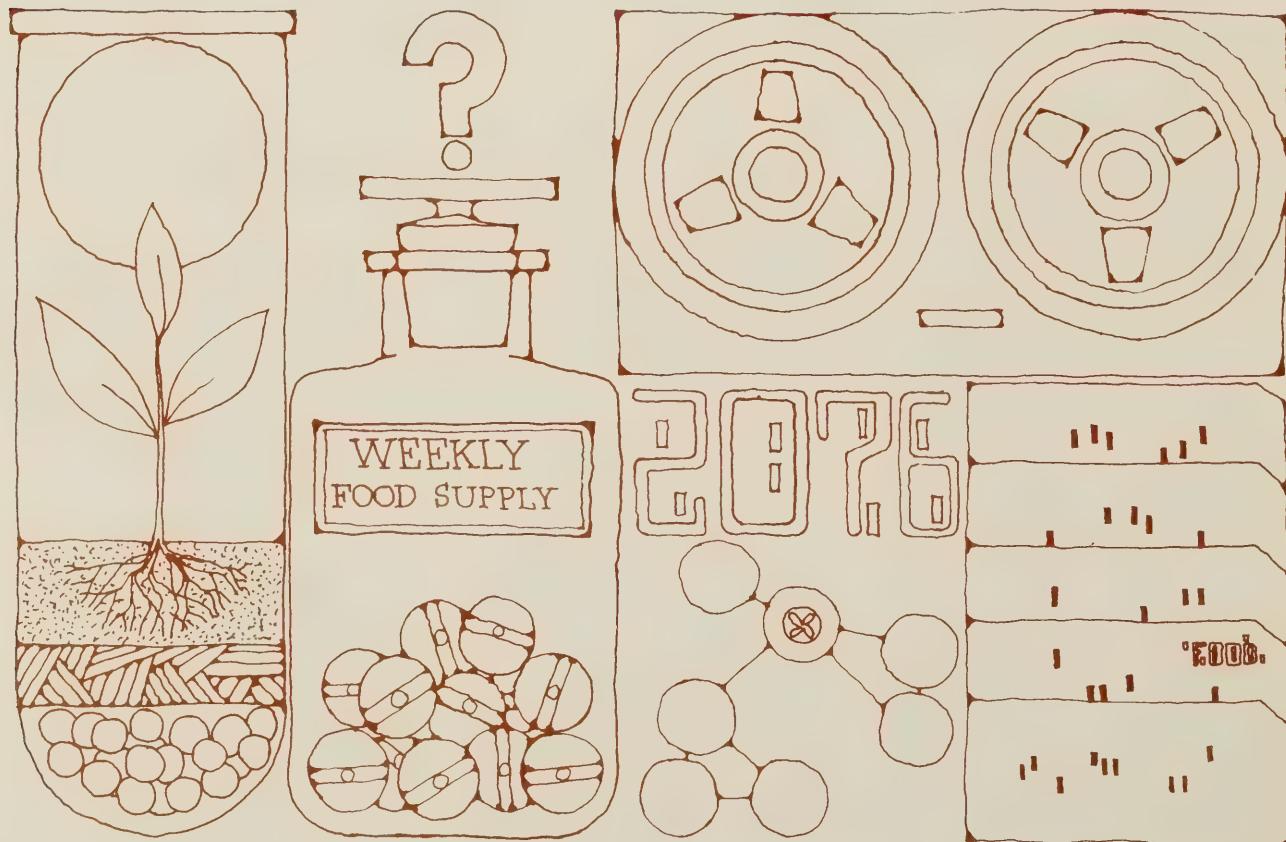
Improved understanding of relationships, so that the computers will give us more sense and less nonsense.

Most important of all, advances in family planning and in greater public acceptance of the replacement-sized family so that mankind might move out from under the Malthusian shadow.

Poetry of agriculture. How many of these things might in fact occur, we cannot now know. But of one thing we can be sure—whatever may be the technical developments in agriculture, its poetry will continue. The wonders of life, growth, and death, the cycle of the seasons, the marvels of continuous creation so clearly manifested in agriculture—these will still be with us. In fact, it might be said that these are the most enduring things about agriculture, and that the subject matter of the poet permits him to be the best prognosticator of all.

What about the institutional arrangements within which crops and livestock will be produced?

Loss of uniqueness. For one thing, agriculture will lose its uniqueness. The farm-nonfarm delineation, which



was basic to an understanding of economic, social, and political events, will become blurred. Delineating between farm and nonfarm will have little more relevance than, say, dividing the present economy into businessmen and nonbusinessmen.

In fact, it will be difficult to tell what is a farm and what is not. Farm production will be merged in an integrated fashion with the acquisition of input items and with the processing, transporting, financing, merchandising, and consumption of the product.

Vanishing family farms. A mixed farming system will emerge. There will be large-scale integrated units, the forerunners of which we already see in the West and South. The family farmer, already under considerable strain, will slowly and reluctantly give up his historic role of supplying all the factors of production: land, capital, and management.

The production of crops and livestock will require farms so large—so much land, so much capital, and so

much managerial skill—that a single person will be unlikely to supply them all.

In commercial agriculture, the nearest thing to the family farmer will be a farm operator who lives on the land with his family, rents his farm, borrows his money, and hires his labor. He will make his own decisions on how he combines these inputs, contracting for both his input items and his output of product.

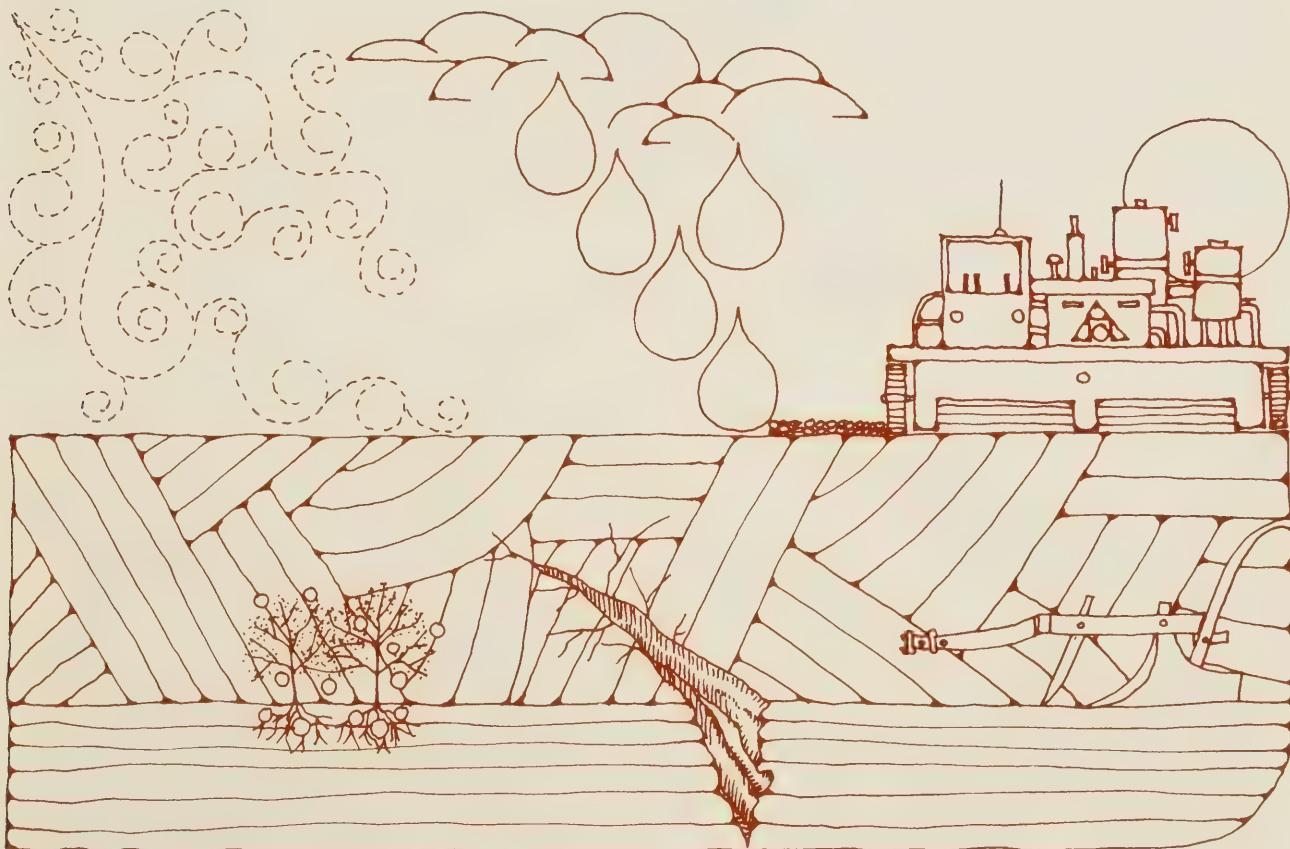
Part-time farms. Besides the farms that produce most of the crops and livestock there will be part-time farms, combining the production of food and off-farm jobs with rural living.

For the first 200 years as a Nation we flocked to the city. For the next 200 years we probably will look toward the country as a place to live. Its warmer personal relationships, cleaner air and water, greater privacy, and greater social stability will look better and better as the years pass. We will be able, in rural areas, to provide most of the social services

and utilities that used to be found only in the cities.

Rural development. Practically every nation now has some kind of rural development program to make the rural areas a better place to live and work. It fits the present and future mood. Two hundred years from now the "City Limits" signs will have lost their significance. They will mark a boundary between units of government; they will have limited social and economic distinctions.

The first 200 years we spent cutting down trees; the next 200 years we will spend planting them. We will put back into trees lands that were deforested in order to be farmed, lands with slopes too steep for modern farm equipment, or too poor to compete with the more productive lands that will be kept in annual crops. Our forests were once considered simply as an obstacle to the plow and as a source of lumber. In the future they will be considered also for their aesthetic and ecological value.



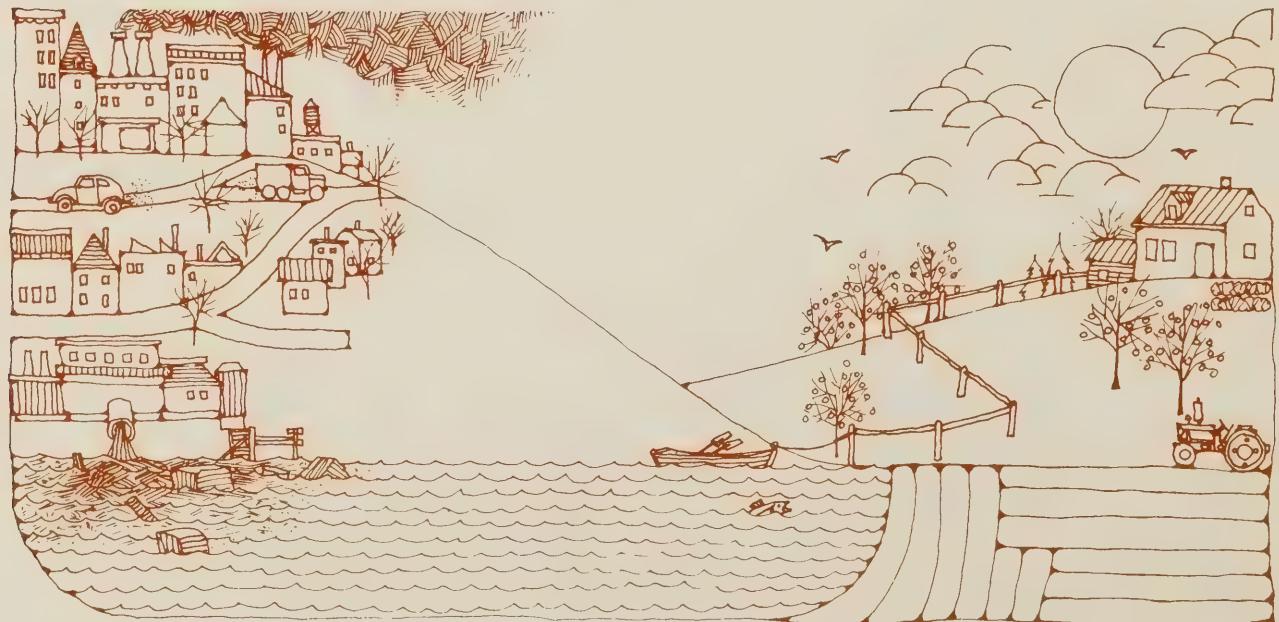


Protect public interest. During most of the 200 years past we sought to get the public domain into private ownership, and to a large measure succeeded. Henceforth we shall be trying to identify and protect the public interest in these privately owned lands.

Is the competitive market to continue as the major, if not sole, determinant of how these lands are to be

used? Whether they will be used for cropping, grazing, timber, mining, recreation, industry, residential uses, highways, airports, wildlife, watershed protection, or flood prevention? What is the legitimate public interest in the answers to these questions and how is this interest to be expressed? We are in a transitional phase with regard to land policy. This will be a major issue during the years ahead.

Checking inflation. An important institutional change which may come about during the next 200 years is the capacity to manage our system of money and credit so as to check or at least reduce the rate of inflation now rampant and worldwide. To accomplish this we may have to devote time, thought, and effort on a scale similar to that expended 40 years ago in coping with the Great Depression.



Two hundred years from now, and probably much sooner, no one will be able to buy a pound of butter or a quart of milk or a bushel of wheat anywhere in the U.S. We will be on the metric system—these products will be sold by the kilogram.

Fate of common man. What will be the status of the individual? Ours has been called the Century of the Common Man. The basic rights of full citizenship have been extended to minority groups that had not enjoyed them. Class distinctions have been blurred. These gains are substantial and must be counted greatly to the credit of the generations past. A floor

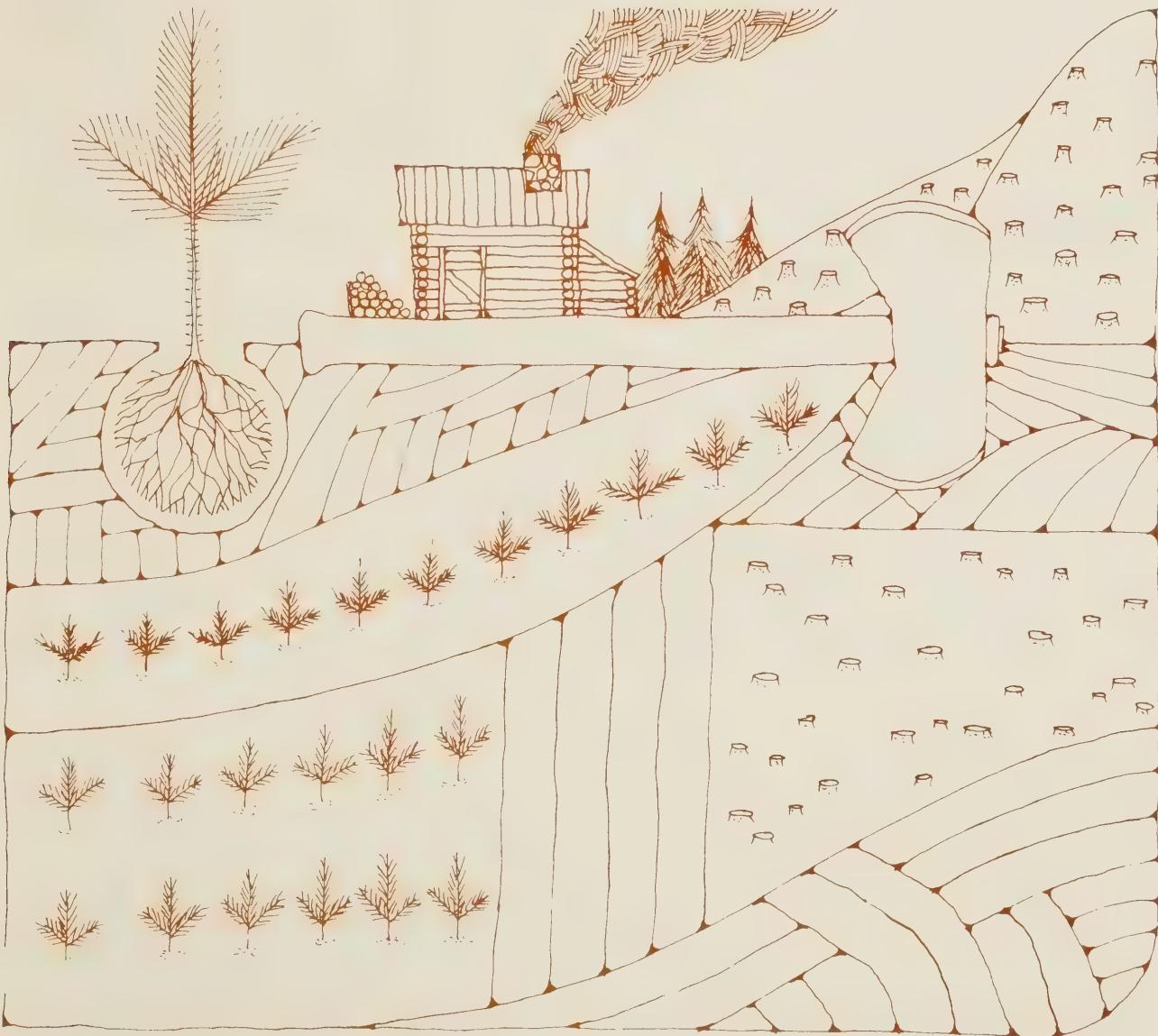
has been placed over the pit of disaster, so that material want is not the problem it once was. During the next 200 years these gains will be extended and consolidated.

Enhance individual roles. These gains have been achieved at a cost, by enormously increasing the role of government and by eroding, to a considerable degree, the feeling of self-reliance that once characterized our people. It will be very important, and very difficult, during the next 200 years to assure that the new-found status accorded to so many of our citizens is used to enhance the role of the individual, rather than to deprive

him of his self-reliance. And it will be very important to see that the vast accretions of governmental power are not exploited by selfish, unwise, ambitious men.

This country achieved its independence by curbing the excesses of a powerful government; it would be a tragedy if we were to drift back into abuses from which we escaped 200 years ago, the escape we are here celebrating.

Market orientation. For the commodity programs in agriculture, the recent trend has been away from strong government decisionmaking and in the direction of market orienta-



tion. It may be that the high tide of government involvement in the production and pricing of farm products was reached some 10 years or so ago, and that the years ahead will see commodity policies more nearly in keeping with the long tradition of our country.

What of the recent rash of causes that have arisen in agriculture—consumerism, the drive for ecological betterment, and the opposition to food additives? No doubt these drives will continue and some good things will be accomplished. New factual information, gradually coming available, should check the excesses of these

movements, while holding their legitimate gains.

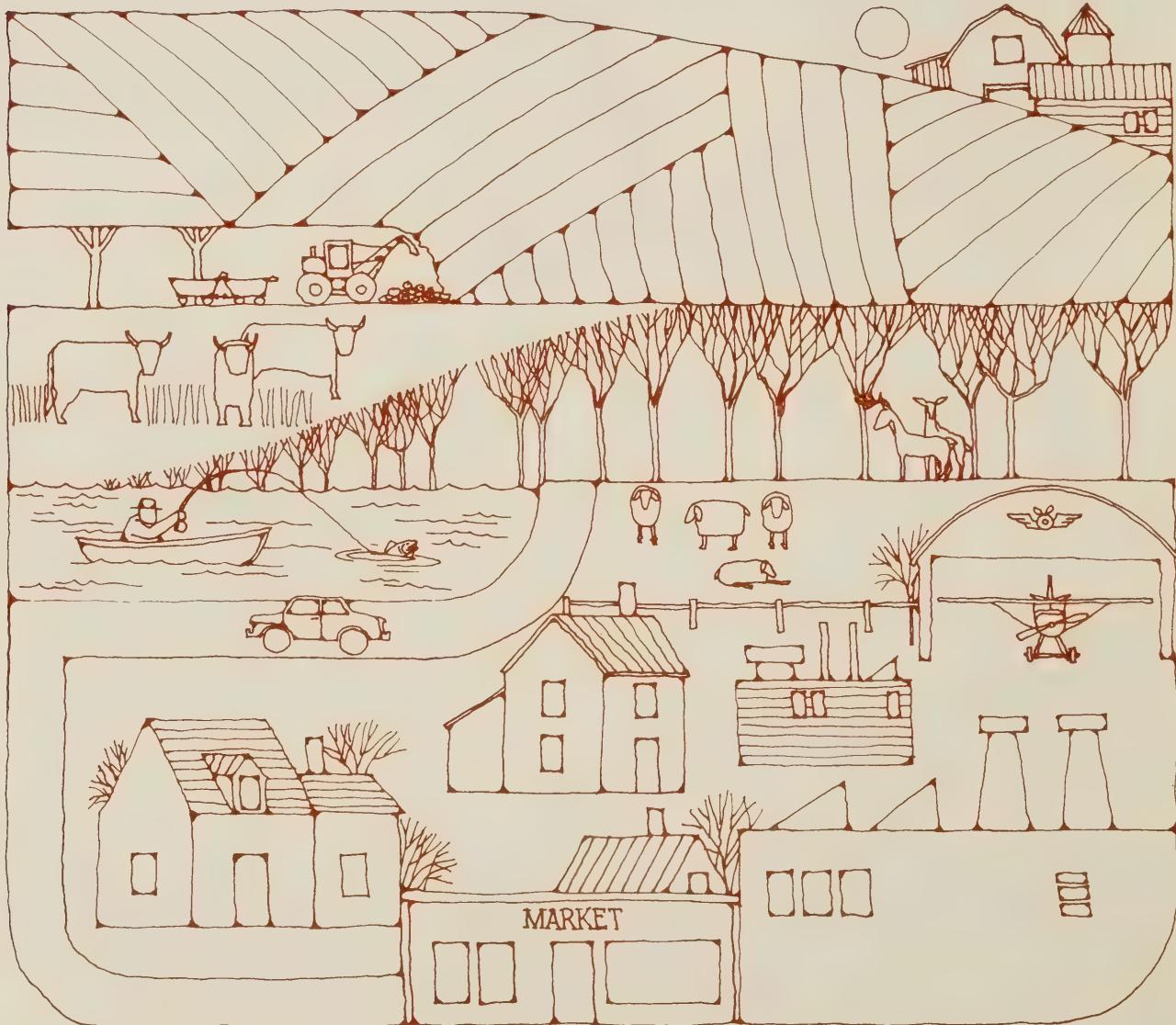
A rose-colored outlook. On balance, this is an optimistic outlook. But even if in general it should in fact be borne out, we could certainly still have problems. It is the nature of the human species to have problems.

Even if all the difficulties that currently are recognized as problems were suddenly solved, a new list would develop within a matter of months.

Time of grief, time of joy. So there will be times of exhilaration during the next 200 years—great feasts and celebrations. And, as the Bible tells

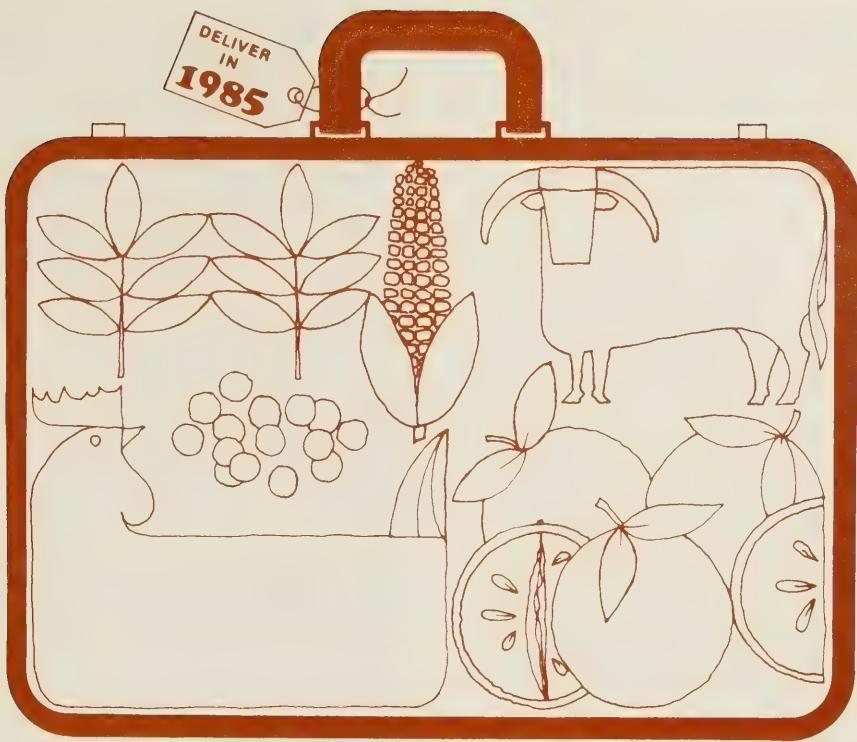
us—we will hear of wars and rumors of wars, and there will be earthquakes in diverse places. Thus, problems will be on the agenda during the years ahead, even though by historic comparison or by objective measurement it might appear that the problems would be of modest proportions.

As a final assessment, we turn to the Book of Genesis for this long-term agricultural outlook statement: "While the earth remaineth, seedtime and harvest, and cold and heat, and summer and winter shall not cease." That forecast has been good for about 3,000 years. It seems not overly presumptuous to extend it for 200 more.



The Decade Ahead

by Leroy Quance



How the U.S. farmer fares in the next decade will depend partly on decisions yet to be made abroad.

Always a main factor in the farmer's economic well-being, exports took on added stature in the early 1970's. World shortfalls in grain production, the currency revaluations, efforts to increase livestock production in many foreign countries, and other economic decisions resulted in unprecedented demands for U.S. grain and wide price swings in domestic farm markets.

Much of this increased demand came from the Soviet Union and the People's Republic of China. A key question now is: Will these nations move toward freer trade and more regular participation in world grain markets? Or, will they continue to make occasional heavy purchases?

Foreign policy decisions about levels of livestock production and grain stocks also will help determine future demand in this country.

While the strength of demand is the major uncertainty, the domestic market will remain the major outlet for the products of U.S. farms, and is likely to continue to grow at fairly stable and predictable rates.

The following projections provide a setting for assessing the impact on agriculture of developments in domestic and foreign markets during the next decade. Three alternative situations are covered: baseline, high demand, and low demand.

Baseline

U.S. population rises to 236 million by 1985 from 205 million in 1970. Disposable personal income per person increases 3 percent annually.

Export demand continues to grow, though limited somewhat by high prices and efforts of major importing countries to attain self-sufficiency.

World capacity for cereal production increases faster than consumption, with the European Community,

Eastern Europe, and the USSR approaching self-sufficiency.

Policies to maintain high prices in European commodity markets encourage substitution of protein supplements and other feeds for grain.

Japan remains the largest single export market for U.S. wheat and coarse grains but the People's Republic of China imports wheat and exports rice.

High Demand

Population rises to 244 million in 1985.

Per capita disposable income increases an average of 3.3 percent annually.

Exports are high because: (1) The USSR and Eastern Europe attempt to increase livestock production at a faster rate, resulting in more grain imports and higher overall trade with the West; (2) The People's Republic of China becomes more trade oriented,

importing more grain to improve diets; (3) The European Economic Community drops its self-sufficiency policy, setting lower target prices for production, thus permitting continued imports of grain; and (4) Livestock economies of the developing world, particularly poultry, grow faster.

Low Demand

Population rises to 231 million.

Per capita disposable income grows 1.2 percent annually. Export demand is the same as in the baseline situation.

The three situations produce markedly different results for the U.S. farmer. Under the baseline alternative, exports would hold at about current high levels and 40 percent above the recent past (1970-72).

The increase in population and per capita income assumed for this situation would sharply boost domestic demand for several food products over 1970-72 levels.

Major increases: beef and veal, 35 percent; chicken, 37 percent; eggs, 10 percent; corn, 25 percent; sugar, 14 percent; citrus fruit, 26 percent; vegetables and melons, 19 percent, and Irish potatoes, 21 percent.

But demand for some products would drop, reflecting changing tastes and preferences. These include declines of 65 percent for lamb and mutton, 4 percent for cotton lint, and 5 percent for sweet potatoes.

Things would work out much better for the farmer under the high demand projection. Exports would be up sharply over the baseline—wheat, 52 percent; corn, 91 percent; grain sorghum, 69 percent; oats, 90 percent; barley, 25 percent, and soybeans, 10 percent.

Domestic consumption of many commodities also would show sizeable increases over the baseline—beef and veal, 8 percent; pork, 4 percent; chicken, 5 percent; citrus fruits, 4 percent; corn, 18 percent; grain sorghum, 15 percent, and soybeans, 6 percent.

The low demand situation, with its slower rates of growth for population and income, would severely depress demand for major farm commodities. Domestic requirements would fall 8

CHANGES IN PRODUCTION BY 1985: THREE ALTERNATIVES

Commodity	Unit	Production 1970-72 av. (mil. units)	Baseline as pct. of 1970-72	High Demand as pct. of baseline	Low Demand as pct. of baseline
Beef & veal ¹	lbs.	22,531	133	108	92
Pork ¹	lbs.	13,951	113	104	96
Lamb & mutton ¹	lbs.	550	35	107	131
Chicken ²	lbs.	8,831	136	105	92
Turkey ²	lbs.	1,837	144	105	88
Eggs	doz.	5,783	110	101	100
Milk ³	cwt.	1,186	102	102	105
Wheat ⁴	bu.	1,505	117	125	98
Rice ⁵	cwt.	85	139	106	98
Soybeans	bu.	1,193	154	108	99
Corn ⁶	bu.	5,089	130	118	96
Grain sorghum	bu.	795	142	115	94
Oats	bu.	831	106	106	96
Barley	bu.	434	127	106	97
Rye	bu.	38.6	104	103	108
Peanuts ⁷	lbs.	3,091	156	104	90
Sugar ⁸	tons	5.9	131	105	96
Tobacco ⁹	lbs.	1,788	120	99	100
Citrus fruit ¹⁰	lbs.	22,749	125	104	96
Noncitrus fruit ¹⁰	lbs.	19,571	104	104	99
Vegetables & melons ¹⁰	lbs.	44,921	126	104	97
Irish potatoes ¹⁰	cwt.	313	114	104	97
Sweet potatoes	cwt.	12.5	95	101	93
Dry beans & peas ¹¹	lbs.	2,112	106	101	95
Flaxseed	bu.	20.6	136	100	100
Hay	tons	128	109	106	96
Silage ¹²	tons	129	113	105	98
Pasture	tons	150	110	107	95
Crop production index	1967=100	108	125	113	97
Livestock production index	1967=100	107	116	105	96
Farm output index	1967=100	108	120	109	96

¹Carcass weight. ²Ready-to-cook weight. ³Milk equivalent. ⁴Grain equivalent. ⁵Rough basis. ⁶Grain only. ⁷Farmers' stock basis. ⁸Raw value. ⁹Farmers' sales basis. ¹⁰Fresh equivalent. ¹¹Cleaned basis. ¹²Includes straw, silage, and beet pulp.

percent below the baseline for beef and veal, 4 percent for pork, 8 percent for chickens, 1 percent for soybeans, 6 percent for grain sorghum, and 2 percent for wheat.

Exports under the low demand alternative are assumed at the baseline levels.

Total farm output would rise a fifth over 1970-72 in the baseline situation. With yields increasing, crops would be produced on only 316 million acres, 14 million less than in 1975. Rye, corn,

silage, oats, cotton, sugarcane, tobacco, sweet potatoes, dry peas—all would require fewer acres.

With high demand, crop acreage would rise to 362 million and output would total 9 percent higher than under baseline conditions. But with low demand, acreage would drop 10 million below baseline levels with production down 4 percent.

Production changes for individual products under the three alternatives are shown in the accompanying table.

Contributors

William D. Anderson, *General Attorney*

Gladys L. Baker, *Historian*

Donald D. Durost, *Agricultural Economist*

Environmental Studies Staff: Joseph R. Barse,
Lee Christensen, William D. Crowley,
Velmar W. Davis, James B. Johnson,
Richard Magleby, John R. Schaub,
Agricultural Economists

Helen W. Johnson, *Sociologist*

Orville Krause, *Agricultural Economist*

Corrine Le Bovit, *Food Economist*

Arthur B. Mackie, *Economist*

Alden C. Manchester, *Agricultural Economist*

Gerald R. Ogden, *Historian*

Don Paarlberg, *Economist*

Jane M. Porter, *Historian*

Leroy Quance, *Agricultural Economist*

Wayne D. Rasmussen, *Historian*

Vivian Whitehead, *Historical Assistant*

Vivian D. Wiser, *Historian*

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